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..THE..
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THE
OPTHALMIC RECORD.

VOL. IV. JULY, 1894. No. 1.

THE PREVENTION OR MODIFICATION OF ASTIGMATISM AFTFR CATARACT EXTRACTION.

By L. B. GRADDY, M.D., Nashville, Tenn.

Read before the Nashville Academy of Medicine, May 24, 1894.

A change in the curvature of the cornea, giving rise to unequal refraction in different meridians of the eye, more or less of which remains permanent, occurs in almost every eye after cataract extraction. This inequality in the curvature of the cornea may be observed before the healing process is complete. Indeed it begins as soon as the cut surfaces are united with sufficient firmness to offer any resistance to the pressure of the contents of the globe; and, continuing, reaches its maximum only when the resistance of the new tissue uniting the wound, becomes equal to the resistance of the surrounding tissue. At this time the new tissue begins to contract, and in many cases the reduction in the degree of astigmatism is remarkably rapid, until finally a point of permanency is reached. In nearly all cases there is a decided reduction in the degree of astigmatism before it becomes permanent, but very rarely does the cornea resume its normal curvature. In smooth operations, without accident to interfere with normal healing, the astigmatism is due to a stretching of the plastic material uniting the wound. Sections, therefore, smoothly made, which give the least gaping during the low resistance period of the new tissue, will leave the narrowest scar and consequently furnish the lowest degree of astigmatism. It is admitted, I believe, that the more peripheral the corneal section, the greater the astigmatism is apt to be, hence I make all my sections distinctly corneal, *and do not turn the edge of the knife forward while finishing the corneal section.* Inclining the edge of the knife forward while completing the corneal section, as most operators do, is responsible, I think, for a large amount of the astigmatism, even when the section is entirely corneal and as smoothly made as it can be with the narrow knife. The small advantage gained in this way by enlarging the opening for the exit of the lens is more than counterbalanced by the evils resulting and the additional risk incurred. As the section approaches a line perpendicular to the plane of the cornea in a definite ratio it favors gaping of the wound, firm union is retarded, and prolaps or entanglement of the iris is encouraged, all of which contribute to the production of astigmatism. By reference to Becker's "Atlas of the Pathological Topograghy of the Eye," we observe that, after healing, the flap somewhat overlaps the stump. The flap bulges and rises while the stump sinks a little into the anterior chamber; the inner inferior edge of the flap is thus lifted up and meets the stump-lip above the line of normal union. This gives a narrow line of apposition, and as soon as the union is firm enough to offer any resistance to the pressure of the contents of the globe the external edges of the wound are separated, giving to the wound a wedge shape with the base outward; thus the vertical diameter of the cornea is lengthened, effecting a permanent change in its curvature. This may take place when the section has been made perpendicular to the antero-posterior axis of the globe—when a perfect flap has been formed, but not to the same extent. The observations of Becker and Norris * furnish an argument, I think, in favor of the flap operation made with a broad knife, but especially against inclining the edge of the knife forward while finishing the corneal section. The superiority of the smooth flap made with a broad knife over the present method of operating is so pronounced that I am inclined to the opinion we are near another turning point in this important operation. The technique is more difficult, it is true, but I believe surgeons at present hold aloof from the broad knife more because of the disastrous results which followed in its wake at a time when the present high state of our art and antiseptics were not dreamed of, than because of the slight difficulties to be overcome in its use. I think it is a question of only a short time when we shall all return to the broad knife and the classic flap operation, slightly modified. I have recently had a knife made which I have used in a few cases and find very satisfactory. The general shape is that of Beer's knife, but the essential points of difference are important. The blade is as thin as it could be made consistent with the requisite degree of strength, and of the same thickness at corresponding points throughout its length. A cross section of the blade shows it to be of single wedge shape with rounded back. For a distance of three sixteenths of an inch back from the point, it is double edged. Owing to the shape and thinness of the knife, when well sharpened, it glides through the corneal tissue with but little more pressure than is required by the Graefe knife; but in the use of the broad knife, the pressure is constant "from start to finish," instead of spasmodic as is the case in the to and fro movements of the narrow knife. The advantages of the broad knife are: it leaves the cut surfaces smoothly sliced throughout the section; whereas the narrow knife leaves irregular, undulated surfaces which do not fit into each other when the flap rides the stump. The broad knife enables us, with care, to lay the whole section perpendicular to the antero-posterior axis of the globe. The smoothly sliced section made with the broad knife is a great gain. There is less gaping of the wound, consequently less danger of infection, union is more rapid and firm, owing to better apposition and broader surface; there is less riding of the flap, and less astigmatism.

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* Transactions A. Med. Ass. 1887.

While much may be done to prevent a high degree of astigmatism by making the section distinctly corneal with a broad knife, perpendicular to the antero-posterior axis of the globe, still there will follow a sufficiently high degree to prove very embarrassing to vision unless corrected. The question, then, arises: Can we further modify or prevent astigmatism by any other means? I think we can. The modification of astigmatism by nature's processes after cataract extraction from its highest degree to one of permanency, is not, I think, by cicatricial contraction alone; but by cicatricial contraction aided largely by lid-pressure. The bulging flap, the faulty point, is favorably situated to receive constantly the greatest pressure the eye-lids are capable of making upon the eye-ball; and the decline in the astigmatism is, as a rule, too rapid to be due wholly to cicatricial contraction.

If lid pressure has anything to do with the production of astigmatism in eyes that have not been operated, it must have a great deal to do with modifying astigmatism produced by traumatism. Believing that lid pressure played an important part in the retrogressive process of astigmatism after cataract extraction, it occurred to me that both cicatricial contraction and lid pressure might be materially assisted by means of the pressure bandage. This aid I concluded could be made effective only after the wound had become firmly healed, but that it should be rendered while the new tissue in the wound was yet compressible. With these views I began the work about two years ago set forth in this paper. It is imperfect, I know, but it furnishes a basis upon which the work may be elaborated. In order to make the tests as convincing as possible I used alternate eyes, excluding from the test all eyes in which any accident occurred during or after the operation to interfere with normal healing. I have now treated ten eyes, with a view to modifying or preventing astigmatism, alternately with ten eyes treated in the usual way, with the results given below. The patients varied in age from fifty-two to seventy-six years. The operations were all made without iridectomy, and as already said, in no case was there any accident during or after the operation to interfere with normal healing. The sections were all made distinctly corneal with a narrow knife, as near as possible at corresponding points, perpendicular to the antero-posterior axis of the globe, thus forming a flap as nearly identical with the old operation as could be made with the narrow knife. A light dressing was put upon all (20) cases, and the patients permitted to sit up or lie down as they felt inclined. In all (20) cases the light dressing was permanently discarded on the tenth day. In ten alternate cases when the light dressing was discarded, the conjunctional sac was irrigated with a boric acid solution (saturated), the eye-lids and brow were bathed with sublimate solution—1:2000—and a dry cotton compress and roller bandage firmly applied and not disturbed so long as the bandage retained its position. The eyes were kept bandaged twenty days. The refraction was tested in all—20 eyes—on the thirtieth day after the operation.

Of the bandaged cases:

4 had 2. D. @ = 8
2 " 1. D. " = 2
3 " 0.5. D. " = 1.5
1 " 0.0. D. " = 0.0

In 10 eyes a total of 11.5. D.

Of the unbandaged cases:

2 had 5.0. D. @ = 10. D.
2 " 3.5. D. " = 7. D.
3 " 3.0. D. " = 9. D.
3 " 2.75. D. " = 8.25. D.

In 10 eyes a total of 34.25. D.

The ten cases treated with a view to preventing or modifying the astigmatism shows an average of 1 15-100 D. of astigmatism thirty days after the operation; while those which were permitted to take the usual course show an average of 3 47½-100 D.; the astigmatism being less than one third as great in the treated cases as in those which were not treated. The whole twenty cases were re-examined in from eighty-seven to ninety-eight days after the operation, when it was found that the total astigmatism in the ten bandaged cases was 6.75 D. and in the ten unbandaged cases 23.25 D., the reduction being, as we might expect greater in proportion in the unbandaged cases, but still leaving the latter with an average of nearly 2.5 D., while the former showed only a fraction more than 0.5 D. The astigmatism will doubtless further decline, but it has not been practicable to follow the cases further.

The degree of the astigmatism in the whole twenty cases was determined by means of the test glasses, verified by retinoscopy. The ophthalmometer would probably have shown a higher degree, but the findings of that instrument, according to Weiland, Burnett, and Edward Jackson, in aphakic eyes, are not reliable.

By reference to the above tables it will be observed that the astigmatism was less in the unbandaged eyes than is commonly found thirty days after extraction of cataract. That I think was due to two causes: 1st. To the character and location of the corneal section, and 2nd, to the fact that they were selected cases—cases in which we should not expect a high degree of astigmatism.

Opinions still differ somewhat in regard to the application of a pressure bandage to an eye as a dressing after extraction of cataract; the tendency is, however, to discard such dressings absolutely. I know of no other experience than my own with the bandage, applied after closure of the wound, with a view to modifying or preventing astigmatism. In a paper read before the Am. Med. Assoc., in 1891, in opposition to pressure as a dressing after cataract extraction, Dr. Edward Jackson says: "After complete closing of the wound there is a distinct tendency to bulging, which pressure, if it could be steadily applied to the point of deficient resistance, and to this point alone, might influence beneficially. But such pressure is manifestly impracticable." So far as the paper shows, this opinion which implies that pressure, unless steadily applied to the point of least resistance would prove worthless, was not based upon practical experience. Direct pressure steadily applied to the point of least resistance *is* impracticable, but my experience proves that such use of pressure is not necessary to the achievement of valuable ends. Whether it would be better to apply the pressure earlier or later than the tenth day, and to continue it for less or more than twenty days must be settled later. I heartily join in the severest condemnation of the pressure bandage as a dressing after the extraction of cataract; but that pressure can be usefully employed after complete closure of the wound, in modifying and preventing astigmatism there can be no doubt.

CATARACT EXTRACTION AN OFFICE OPERATION.

By S. MITCHELL, M. D. Hornellsville, N. Y.

Oculist and Aurist to St. James Mercy Hospital, Consulting Surgeon to The Hornell Sanitarium.

About a year ago, during a conversation with Dr. Lucien Howe, relative to the care of patients after cataract extraction, he remarked that he thought the day not far distant when the ophthalmologist would consider cataract extraction a suitable and safe office operation.

At that time I did not concur in this opinion, although I was then making nearly every operation upon the eyes, office operations, except cataract extractions. But this, the capital operation of eye surgery, I did not think would ever be brought to the plane of tenotomies, plastic and lid operations, and the other minor affairs that go to make up the daily routine of the oculist's duties, and bring some diversion from the unvarying round of refraction work, with the same old, old story of eye-ache, headache, smarting lids, etc.

But in the light of a recent experience, the particulars of which will be related farther on, I have changed my mind somewhat in this regard. And can now see no reason why simple extraction, in the majority of cases, should not be performed in the office and the patient walk or ride to their home or boarding place afterwards.

Certainly the office of the oculist is, or should be, much more conveniently arranged as regards light and appliances, than is, or can be arranged, the room assigned to cataract patients in private dwellings or boarding houses.

Who has not had their ingenuity severely taxed to provide an operating table of suitable height and size, when about to operate at some private dwelling? The head of the ordinary couch, found in most houses, is too high to allow one to sit and operate, and too low to admit of standing while operating, and the dining table is too unwieldy to bring near enough to the window to secure good light. I have frequently made use of the couch while operating by perching myself upon a chair in which was placed the old family bible, or a large dictionary. Thus elevated, my shoulders would be brought up to the proper height for ease in operating.

In many farm houses I have found a low, narrow, old-fashioned lounge, whose joints, loosened by age, would permit the removal of the head-board, and thus a very suitable appliance has been provided, just the proper height for operating while sitting. By no means the least unhandy of all the appliances that I have been called upon to devise for an operating table in cataract extraction, was an ironing-board, placed upon two chairs. Verily, "necessity is the mother of invention." But to return to the case referred to in the beginning of this paper. It was a case of simple extraction, on an old gentleman eighty-five years of age. His cataracts had been very slow maturing and he was very anxious to be rescued from his semi-blind condition.

The day set for his operation proved to be quite dark and rainy, and as the room assigned him at a boarding house near my office was poorly lighted, I decided to operate in my office. The operation was done under the use of cocain without iridectomy. A few drops of a one grain solution of eserine was instilled into the eye and both eye bandaged.

I accompanied him to his room which was about a half block from my office, and up two flights of stairs, where I left him seated in an easy chair, with the room only darkened by a light window shade (I gave up keeping cataract patients in a *dark* room and in bed, several years ago). His recovery was uneventful, and at the end of the first week he was visiting my office two or three times daily. At the end of the second week I again operated upon his eye at my office, performing discission of the opaque capsule with a knife-needle securing immediately a large, clear, central pupil.

The day following the discission his vision was 20-70 with +6.50○+ 8 Cyl. axis 165°. Although this is my first office operation for extraction of senile cataract, I have made discission of secondary or membranous cataracts, also discission for the solution of soft cataracts, office operations, for some time past.

I one case, where I performed discission for secondary cataract one month after the extraction, for a gentleman sixty years of age, he immediatedly after the operation returned to his home seven miles distant in the country, alone in his carriage, and I did not see him again for several weeks. When he returned for his glasses, vision with a +9.50 was 20-15.

I have recently performed simple linear extraction in one case, and extraction of soft cataracts by suction on three different occasions, all as office operations, the patient walking or taking the trolley car to their dwelling places after the operation, and returning to the office the following day for treatment. In no instance was there any interruption to a speedy recovery.

The apparatus used in the suction operations, is a very simple contrivance, and although the idea is not new, I think the material used in its construction, and in just this application presents something of a novelty. Perhaps I am the first to make the application. It consists of a glass pipette, with a slim, nicely tapering point, the edges of the glass at the point being rounded by heating it in a gas flame. Over the other end, usually occupied by the rubber bulb, is stretched one end of a piece of rubber tubing about two feet long, and the apparatus, costing the insignificant sum of twenty-five cents, is complete and ready, with a little assistance from the operator, to accomplish the most important part of the operation. My method of operating is to open the anterior chamber at the temporal side with a keratome, making an incision in the cornea about seven millimetres long, the same as for linear extraction. A toothed cystitome with a sharp blade, two and a half millimetres long, is then introduced, the capsule opened freely and the substance of the lens thoroughly broken up. Taking the free end of the rubber tube in the mouth, the point of the pipette is introduced into the anterior chamber until it reaches the center of the pupil. Then by suction the air in the tube and pipette is exhausted, and the soft lens matter cannot do otherwise than quickly jump into the body of the pipette. I never move the point about under the iris in search of pieces, but content myself with taking all that can be secured at the centre, which is generally the major portion of the crystalline. A subsequent needling to incise the posterior capsula, is usually all that will be required to give good vision.

I have a patient now under treatment, a German boy, fourteen years of age, with congenital cataract. He now has in the right eye with +9.50 lens, vision of $\frac{20}{L}$ through a pupil in the centre of a partially absorbed soft cataract. This is the result of a suction operation first, and then four weeks later a simple discission of the capsule, where it was exposed in the centre, gave a nice, clear pupil and vision as above recorded.

On the 21st of May last I operated upon the left eye, using the suction apparatus, as described above, and removed nearly the entire lens. At the present writing (three days after the operation) there has been but very slight reaction, and absolutely no pain. The pupil is quite clear, and vision is $\frac{20}{c}$ There is a thin capsular membrane that may require discission to give good vision, although there is quite a rent in the capsule now, caused by the pressure of the vitreous as the lens matter was removed.

The reaction following all of my operations of this sort, has been no more severe than after simple discission, and the patients have been spared the ordeal of several operations. Although slight, they are nevertheless looked forward to by the recipient with anything but pleasure, and vision is secured without tedious months of waiting.

A CONTRIBUTION TO REFRACTIVE CORRECTION.

By JOHN C. MORGAN, M.D., Philadelphia, Pa.

To begin with I would invite attention to some evils attending the use of *one pair* of glasses for distance, and for close work. Firstly, the lateral and vertical *centering* of the lenses for the one purpose necessarily differ from that for the other; and any attempt to compel the eyes to adapt themselves to a common centre for both, is necessarily futile, if perfect central refraction be, as it is, important. Mere mention of this should suffice to show the impropriety of this common practice. Another objection to the same is that, whereas distant vision requires the lenses to stand almost vertical, close work demands a considerable tilt of these, even when identical plus numbers are indicated. That failures are largely related to such conditions is apparent. A third objection applies, where distant vision requires concave glasses; particulary if the two eyes be different, and the organism, with the power of accommodation, feeble. The effort required to overcome the dispersion of rays by the glasses, is considerable; and the effect decidedly morbid. Plus lenses instead, are needed for reading, most frequently.

Again, all *bifocal glasses* are open to serious criticism. The first point is self-evident, viz: that in *walking* one must look through the lower, the reading lenses, almost to the exclusion of the upper, or distance glasses, producing confusion, and sometimes vertigo.

The second is that this is made worse by the convergent centering required for reading, etc., is inimical to such distant use of the lenses, unless it be that the nearly parallel outlook of the eyeballs at the distant pavement can escape from interference by the reading lenses altogether.

A third objection is that, unless the main lenses are provided with *two centers*, the calculated refraction will necessarily be false for close work. A lens centered for distance, and in a vertical position, does not add its exact central refraction to the near glass cemented to its lower periphery! Something very different results; and this means an astigmatism due to the "corrective" glass; no doubt, a prolific source of failure. This *astigmatism of the lens* is duplicate; being due to both a defective reading centre, and the vertical (practically oblique) position of the lenses.

The only way to perfect results in bifocal glasses seems to be in making the distant lenses separate, as of old time, from the near; the former, nearly vertical, and centered for distance, only; whilst the near glasses should occupy only the inner and lower segments of the (spectacle) frames, independently centred for convergence, to the ascertained degree needed for reading; and (a more difficult undertaking) *tilted*, for the special lines of close vision. Failing in these requirements, perfect bifocal glasses seem to be impossible. Besides, the near lenses, with one surface fully corrected, *per se* should be cemented, by a plane surface; and if this be impracticable, there must be entirely distinct pieces, separated by a line, as of old, from the distance glasses. In any case the near correction should be absolutely independent of the other. Furthermore, the frames for near work should be arranged for convergence of the eyeballs; but in one plane, for distance.

None of these observations are made from any mere theoretic views, but all have sprung directly from practical experience.

Germane to this subject, in the proper adjustment of the *clips* now so commonly used to fix eye-glasses. Not only should they perfectly fit the individual nose, but also, the relative pressure of their upper and lower ends must be exactly graduated. Particularly, the principal hold is to be given to the *upper end*. Thus, the outward displacement of that end, so annoying to the wearer, is prevented; whereas, a plus of pressure at the lowest end of the clips causes the evil referred to.

Once more, a complex correction, as for astigmatism coupled with presbyopia, both requiring strong convex lenses, as for reading, may give rise to *double vision*, by prismatic action, thus: X, a straight line being used as a test. This must be examined and further corrected, by added prisms; dividing the addition between the two eyes, in the usual way, in making the prescription.

Still further, the lenses should, in all cases be of *good diame-*

ter, not only for cosmetic reasons, which are important, but also because vision is strained in using a lens which constantly forbids every slight excursion of the eyeball, brings its edge frequently to, or within the line of sight. This is the more annoying, when the lens is enclosed by a metallic rim, and also even when metallic fastenings encroach upon a marked lens.

IRRITABLE ACCOMMODATION.

As atropia and the like produce unpleasant effects, at times, much has been said and done, looking towards their disuse. Irritable accommodation, however, often requires special control in order to fit glasses at all. Not infrequently, systemic and mental causes promote a spasmodic ciliary, or a muscular paralytic state. These are amenable often to relief, and even to cure, by simple and unobjectionable measures.

Firstly, a series of preliminary instructions are useful. These are:

1. Let the visit be in the forenoon, before general and local fatigue has set in.

2. Avoid *studying* the answers to test-glasses; a studied answer is likely to be worthless. The reply should always be instant and off-hand.

3. Remember that the successive lenses placed before the eye are commonly but very slightly different in strength; therefore, do not stop to puzzle over that fact, but, as before said, answer "better," or "worse," instantly.

4. Do not *try* to see anything; let the seeing be altogether involuntary, as it were.

5. Close the eyes, in a quiet way, the moment the answer is given, *every* time, without telling; keep them gently closed, until again directed to look.

The oculist, however, is to remind the patient of these points as frequently as need be. In addition, the *mydriatic of darkness* is to be further invoked, by always having the patient's seat in a dark corner whilst the test cards are well illuminated.

DRUG EFFECTS.

Refraction is greatly influenced through innervation and nutrition by drugs. Hence correction is most satisfactory when made after all drug action has ceased.

THERAPEUTICS.

Certain drugs, in minimum, that is, in "alterative" doses, and given singly, have proved their value in many instances, in the relief of some of these troublesome conditions. Among them, *Santonine* has signalized its utility in some cases. *Cinchona*, when there is anisometropia; the right eye having, in my experience, usually, the shorter focus, using the date-line of a newspaper as a convenient test. Such cases are often convalescent from parturition, or from acute diseases, who have too early and unduly taxed their eyes.

Cimicifuga is related to nervous and rheumatic troubles; *physostigma* to progressive myopia; Argent nit, and Lilium tigrinum, to functional astigmatism, etc.

Apart from the subject of refraction, a word as to the therapy of *Glaucoma*. Two drugs seem especially *en rapport* with this affection. If acute, with sharp violent pains, *Spigelia*; if subacute, with dull pains, *Pulsatilla*. If there be periosteal tenderness and pain, *Mercury* may be considered in addition.

FURTHER OBSERVATIONS ON THE EYE OF THE NEGRO. *

By CHARLES W. KOLLOCK, M.D., Charleston, S. C.

In a former paper on this subject, it was concluded that the eye of the negro had deteriorated since he became free, and that this was due to the following causes: 1. To syphylitic infection; 2. Lack of good and sufficient food and clothing; 3. Total disregard of sanitary and hygienic surroundings; 4. Frequent sexual intercourse with whites of low condition, which has produced a race—the mulatto—that have inherited all the weaknesses of both races, and hence are rarely healthy, but are generally syphilitic, scrofulous, and tuberculous; 5. Education implanted upon such a rotten foundation has produced its ill effects, such as myopia and attendant evils. Syphilis has caused wide-spread destruction among them, and it is not an exaggeration to repeat that but few remain who do not show symptoms of infection. The eyes especially have suffered from this disease, and blindness is increasing rapidly. Ignorant and careless of consequences, they rarely consult a physician when the disease is in its incipiency, so that when seen iritis is usually well advanced, synechiæ firm, pupils occluded, and general inflammation of the uveal tract, and choroid is not unusual. When there is keratitis, and this occurs in 37 per cent. of all their diseases of the eye, ulcers have extended over the cornea, and eaten into the layers proper, and perforation is the rule. When it is realized that so large a per centage have keratitis in some of its forms, and that they rarely seek advice until serious injury has been done, it is not difficult to understand how fast impaired vision and blindness are increasing. Kerato-malacia associated with xerosis of the conjunctiva is a frequent and interesting condition seen in negro children, and more commonly among the blacks than mulattoes. It is not often found in adults, and in Charleston has never been seen among the whites, though there are many who live in similar condition and who have like surroundings. There can be no doubt but that the disease is due to a lowered vital condition, and it usually occurs in weakly children from one to eight years of age. Some show undoubted signs of inherited syphilis, others are scrofulous, and some tuberculous, with cavities in the lungs and deposits in the mesentery, while others do not appear to have any bodily affection, but all are night-blind, and this more than any other symptom induces the parents to bring them for treatment. It has been thought that perhaps malaria was a factor in its causation, but examination of the blood has so far not proved anything worthy of note. The existence of a bacillus* has been suspected. The negro lives commonly on hominy (grits), rice, fish, and bad hog meat, and it is possible that the kind of food may have something to do with the condition. The whites do not eat as much fish, and the quality of hog meat is better than that used by the negro, who will frequently buy strong smelling meat in preference to that which has no odor. Treatment does much for those in whom the cornea is slightly affected, but it has been the experience of the writer that when the entire cornea breaks down and suppurates (gangrene), it avails little, and the patient soon dies. Malaria is undoubtedly a cause of keratitis among them, and when such is the case there will be periodic exacerbations. These cases are rapidly improved by large doses (gr. xx.) of quinine given at short intervals for several days in succession. But in all these cases of corneal trouble, specific treatment will be of great value. The negro is a curious being. He will sit, ax in hand, on a pile of wood and freeze to death; and he will hold a prescription which can be procured free of charge, and yet not have it filled. So that treatment is not always satisfactory: nor can you depend upon him to carry it out. But for certain things he has a predilection, and one of them is for "salves." Any greasy dirt that he can rub in will afford him pleasure. Therefore taking advantage of this weakness, it is best to begin treatment with mercurial inunction, than which there is no better. He will faithfully rub a drachm of this into his skin twice a day, and the results are magnificent—it is food and medicine, he responds beautifully, and the efficacy of drugs seems assured. They seem to bear mercury better than the whites, and inunction may at times be continued two weeks or longer. Conjunctival inflammation of a mild character is more frequently seen among the mulattoes, but this may be due to the fact that refractive errors are more common with the latter, and also that they use their eyes more for trying work than the blacks do.

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* Read in the Section of Ophthalmology, 1st Pan-American Medical Congress, Washington, D. C., 1893.

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* It is stated that the bacillus has been found by Dr. Weeks, of New York.

Trachoma is equally rare among both blacks and mulattoes, but undoubtedly occurs. Strange to say, ophthalmia neonatorum is not very common among them. The gentlemen who have done the practice for the poor in Charleston say that it occurs in the blacks less frequently than among the whites. Certainly gonorrhœa does not seem a very prevalent disease with them.

Recently two cases of leprosy have been seen in mulatto men by the writer. One man was about sixty years old, and the other twenty-five. No other members of their families were affected, nor were they related. Both had the nodular infiltration along the eye-lids, and the ciliae had dropped out. In the older man the diffused progressive opacification described by Hulanicki, was shown. It extended upon both corneæ from the upper margins to about the centers. The surfaces were smooth, there was no inflammation or photophobia, and the haziness was either between the conjunctival layer and Bowman's membrane, or involved the latter. In the younger man was seen the other mode by which the disease affects the eye—the nodular infiltration of the cornea. This Hulanicki says is seldom a primary affection of the cornea, but usually extends from the sclera. This patient had also some signs of syphilitic affection, as the bones of the nose had been destroyed by ulceration, but leprosy and syphilis seldom co-exist in the same person.

Refractive errors are met as commonly among the mulattoes as the whites, but as yet myopia is not quite as frequent in occurrence, though it is undoubtedly increasing. In the pure black refractive errors are the exception, myopia has never been seen by the writer, but as their education advances, they will at no distant date have the civilized eye.

ANISOMETROPIA.

By C. M. HOBBY, M.D., Iowa City, Ia.

It is apparent that the discussion of many important points connected with the function of vision, and especially of those bearing upon our field of work as practical ophthalmologists, is obscured, rather than cleared up, by too close adherence to the consideration of the eye as an optical instrument.

The visual function is something more than the performance of the optical work of an apparatus with lenses, diaphragm and screen corrected, adjusted, (we cannot say "centered"), and focussed, though it may be in strict accordance with mechanical principles and dioptric art. The eye does not complete the visual process. Its work requires interpreting, like that of any other instrument, and the interpretation is essential to vision. Not only this, but we are compelled to believe that the interpretations are not instinctive, inherent, or mechanical, but (analogy still holds good) in accordance with experience. Binocular vision extends not only the field of work of the combined instrument, but enlarges the experience. The doctrine of identical points, in so far as it assumes that each particular point of the retina of one eye co-operates with a certain other particular part of the retina of the other eye, under the mutual domination of a single "high center," is not established, and its assumption, I think, leads away from the solution of practical problems concerning acuteness and ease of vision. The hypothesis that the coincident movements of the eyes in search of an object of fixation, external accommodation, etc., are governed by a mechanical apparatus like a Jaquard loom, with a constant of tention for each particular element, seems even more foreign to the analogies of nature.

Anisometropia, or rather the suggestion of it, has been very remunerative to the itinerant spectacle venders, and has explained misfits in glasses and uncured asthenopias. A few years ago nearly every patient who had been struggling unsuccessfully with asthenopia was certain that his difficulty came from unequal refraction, and reluctantly accepted evidence that his eyes were nearly equal. I have reason to believe that anisometropia, while not rare is seldom of importance as a disturbing factor. In over 1,200 cases of error of refraction occurring in private practice and carefully noted, I found but 83 with a difference between the eyes of more than 1.00D.

While the proportion of asthenopic cases in the general collection was 58 %, in the anisometropic cases it was less than 52 %, showing that the difference between the two eyes was an unimportant factor in the production of asthenopia; the thirteen cases of strabismus in the group accounts for the smaller percentage of asthenopia, since there is rather less asthenopia amongst the older strabismus patients than amongst others having equal refractive errors. Thirty-six were hyperopic, thirty-seven were myopic, and ten were hyperopic in one eye and myopic in the other. Until about five years ago, the doctrine of judicious compromise was followed in the treatment of these cases; latterly the most perfect correction possible was made for each eye independently, and the patient directed to keep the glasses on, regardless of discomfort, for three weeks; a few were assisted by a week of thoroughly paralyzed accommodation; few required any assistance, and I believe all are wearing at the present their complete correction with comfort.

These results indicate that when custom establishes toleration, the different sizes of the retinal images, and the necessarily different shapes in some cases, are assimilated by experience, accepted by the brain, and used in intellection, with no more cognizance of the difference of the images than there is of the retina as a fact. In addition as any considerable amount of ametropia frequently results in *amblyopia ex anopsia*, if this term may be stretched over those cases where imperfect vision is the result of absolute inexperience with perfect retinal images, it is important that visual correction should be sought as early as possible. To obtain the greatest acuteness of vision, binocular as well as monocular, in anisometropia the three following rules have seemed to me of great importance.

First: Complete correction of errors of refraction. For reasons given elsewhere, it is better in children to correct the corneal astigmatism as indicated by the ophthalmometer rather than the amount subjectively determined.

Second: The correction should be worn constantly. The patient should at no time remove the glasses to look at objects, and children should be guarded against looking over or to one side of the glasses. Experience shows that the mental habit of best use is developed by enforcing this rule absolutely, then after a few days, or rarely weeks, objects will appear correct in size, shape, and position; while, if the glasses are laid aside occasionally for a few minutes, more discomfort will be felt, a longer time will be required to establish the mental habit of use, and this result may be defeated. This statement is made from the results of experience, and it is fortified by numerous observations of tolerance of glasses totally unsuited to the patient's use. If the eyes will bear without injury to the optical apparatus, and even without discomfort, glasses which are entirely wrong, and which increase the refractive error, I think we may drop our apprehension of injury when we succeed in getting a perfect image upon the retina, and trust the brain to assimilate two of them, so much the better, if assimilation be at all possible.

Third: Training the eyes, separately and together. The tone, vigor, alertness, and co-ordination of muscular movements are developed, improved, and increased, by use, not by rest; and in all cases of anisometropia ocular gymnastics should constitute a part of the management; and this is especially necessary where strabismus is associated with anisometropia. In such cases ocular gymnastics is at least as important as correction of the refraction, and the two enable us not only to overcome squint, but to restore and maintain binocular vision in a much larger proportion of cases than is generally accepted.

A DUCTION INDICATOR AND DEVELOPER.

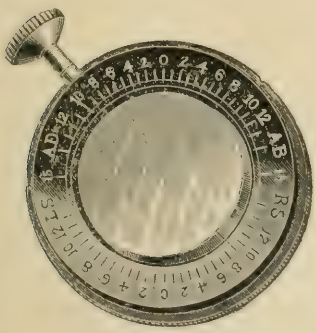
By A. E. PRINCE, M. D., Springfield, Ill.

In view of the fact that every progressive ophthalmologist recognizes the importance of making the test for adduction, abduction, and right and left sursumduction, a factor in the examination of every case in which a disturbance of the equilibrium of the recti-muscles is suspected; and in view of the additional fact that these tests are too often omitted, owing to the time usually consumed in placing successively before the eyes prisms of various strengths, it has been my pleasure to request F. A. Hardy & Co., of Chicago, and Bonschur & Holmes, of Philadelphia, to construct an instrument to facilitate these observations.

The inconvenience and inaccuracy arising from the employment of individual prisms, has been appreciated since the original contribution of Graefe, and efforts to overcome the difficulty have repeatedly been made. The original instrument was that of Hershel, by which two prisms were revolved over one another. This was modified by Stokes, Snellen and Creté, and finally left in so imperfect a state that it never became popular.

The idea was taken up by Dr. S. D. Risley, of Philadelphia, who had a variable prism constructed, which, for mechanical and optical precision, is a source of admiration. His instrument registers in a quadrant of a circle one and one-half inch in diameter, thirty degrees, owing to which, the graduations near the zero point, are very closely approximated.

This constitutes an objection which has been overcome by Dr. Jackson, by means of a third prism of fifteen centrads to be so placed in combination with two of seven and one-half centrads each, that the divisions are larger near the zero point, while at the same time he secures a series of thirty centrads in a semicircle of rotation. Prisms have been mounted is series so that they may be passed in succession before the eye, to all of which, there is an objection arising from the decided increment of muscular contraction required at the point of transition from one prism to another. To avoid this objection, and at the same time, supply a means by which the character, as well as the quantity of tension exercised, may be at once apparent to the observer, I have suggested the improvement of the Risley prism by reducing the amplitude from thirty to fifteen degrees and substituting a pinion movement for the inconvenient movement at present employed. When the instrument is held before the right eye the particular muscular tension required to overcome the prism at each point in the circle is denoted on the circumference by the letters AD, AB, RS, and LS, to indicate adduction, abduction, right and left sursumduction.



The instrument is made after the pattern of my phorometer, published in the Archives of Ophthalmogy of 1893, p. 372, and subsequently imdroved by Bonschur and Holmes, of Philadelphia, and is furnished with a convenient handle, which may be held by the surgeon or patient while making the observation.

The revolving prisms are of seven and one-half degrees, so that a maximum of fifteen degrees is attained. In using the instrument for testing right and left sursumduction and abduction, no auxiliary prism is required, but in testing adduction, it is usually well to commence with a twenty degree prism, base out, before the left eye. This secures a range from five degrees to thirty-five degrees, which is increased to fifty degrees by placing a fifteen degree prism before the right eye.

The rachet pinion is placed at an angle of forty-five degrees with a radius passing through the zero point, so that when held by the physician or patient before the right eye, the pinion is always accessible, and the result so readily obtained that the tests are employed in cases in which they would otherwise often be neglected.

The instrument is scarcely less valuable as a developer of the strength of the muscles, which may be exercised daily to a greater and greater degree.

Hoping that the profession may find it useful and convenient, the instrument is herewith submitted for criticism.

TWO CASES OF DOUBLE SIDED ECTOPIA LENTIS.

By L. D. BROSE, M.D., Ph.D.
Oculist and Aurist, St. Mary's Hospital, Evansville, Ind.

Following Sippel, I use this term to designate congenital lens displacement, and in contradistinction to displacements which occur after birth, through disease or traumatism. Anomalies of this kind are not so very rare, yet when found in mother and child are worthy of being placed on record. September 18, 1893, Amelia Kart, 14 years, was brought to me with a history of having been near-sighted all her life. With the left eye, distant vision was limited to counting fingers at three feet; and with the right eye, the same at two feet. With the left eye she could read none of Snellen, while with the right eye she read

read Snellen II at four inches poorly. The eyes were normal in size and with perfect movement and form. The anterior chamber, however, was of irregular depth, the lower half being deeper than the upper, and with movement of the eye-balls there was tremulousness of the lower portion of the iris. After dilating the pupils with atropine and illuminating it with the ophthalmoscopic mirror, the dark border of the lower edge of the lens could be seen occupying the upper third of the pupillary space. Approaching to within twelve inches of the eye, two distinct images of the fundus were obtained, the one a true, distinct image and seen below the lens, the other an indirect or inverted image, and seen through the lower portion of the lens occupying the upper post-pupillary space. Although the patient was not aware of seeing double, still a true monocular diplopia could be occasioned by bringing a lighted candle to within a short distance of the eye. The projection of the image seen without the lens was correct, while the projection of the image seen through the myopic lens portion of the pupil because of the prismatic action of the dislocated lens body was contrary and false. There were no opacities in the lens nor malformation either in this body or in the fundus oculi. With a plus 10.D. spherical lens vision in the left eye was brought up to $\frac{15}{L}$ for the distance, and with a plus 15.D. spherical to reading Snellin II fluently. The right eye in the distance could be made to read with plus 9.D. spherical $\frac{8}{C}$, and in the near with + 15.D Snellen IX poorly. The mother, a woman 39 years old, who accompanied the daughter, seeing how much improvement was obtained by the adjustment of the proper glasses, next spoke up saying that her own eye-sight had likewise always been bad. With the right eye she read $\frac{2}{LXX}$ and with the left eye $\frac{15}{C}$ for the distance, while near she could read none of Sn. with right eye, and with the left eye very poorly Sn. 1 at five inches. After dilating the pupils with homatrophine, both lenses were found displaced upwards and slightly outwards, after the manner in the daughter's case. Vision in the right eye could be but little improved, while in the left eye with 0.5 ≍ — 4.00 cyl. ax. 180, it increased to $\frac{15}{XL}$ for the distance and with + 3.00 cyl ax 90 to Snellen I at six to eight inches fluently. Inquiry into the family history elicited that both her father and mother had had good eye-sight; one brother, however, who died at 27 years, had weak eyes. The cause of congenital lens displacement has, and undoubtedly correctly so, been attributed to an irregular development of the suspensory ligament. Other embryonal developmental anomalies are not infrequently associated with it, such as microphthaldmos, coloboma of the iris, choroid and lens itself. A fact of considerable interest in the present cases is that the anomaly reproduced itself in the offspring so similarly that the right eye, just as in the parent, could be given so little vision while the left eye could be improved so very much. Save in the way of adjustment of proper glasses, either with or without an indectomy, we are powerless to improve this condition.

A NEW INSTRUMENT FOR MEASURING THE INTER-PUPILLARY DISTANCE.

By C. H. PERRY, M.D., Oneida, N. Y.

The measurement of the distance between the optical centers of the two eyes, for the purpose of locating the centers of correcting lenses, made in the usual perfunctory way, seems generally to answer well enough, but in many cases where an unusually thick lens is prescribed or in cases of oblique astigmatism, it is believed that better practical results would follow an accurate measurement.

The writer has been using, for the past year, a very simple but very accurate instrument for this purpose, and is led to call the attention of the profession to it, by reading in the last number of the Archives of Ophthalmalogy, a description of an instrument for the same purpose by Dr. S. J. Bumstead.

The device which is the subject of this article, consists of a small, square steel rod, surmounted by two plane mirrors, each one inch square. One of these is rigidly fixed to the rod and the other slides thereon. The plane of each mirror is vertical, and cuts the axis of the rod at an angle of 45°.

The rod is graduated to show the distance between the centers of the mirrors, and through each of these centers, a vertical line is drawn, with a sharp tool, through the amalgam to the surface of the glass.

Fig. 1. shows a perspective view of the instrument and Fig. 2. an end view, as seen when in use.

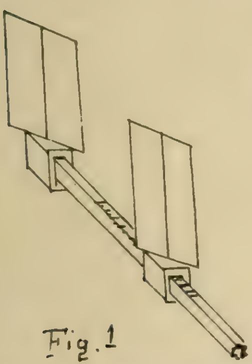


Fig. 1

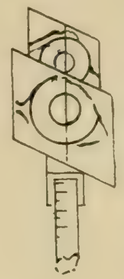


Fig. 2

To use the instrument the operator sits at the right of his patient and directs him to look at some distant object, or at a near one, if the measurement is to be taken during convergence. He holds the rod horizontally before the patient's eyes and low enough to allow the patient to look over the mirrors, with his own eye on a little higher level than those under examination, in order to see into both mirrors.

He then moves the instrument into such a position as to see in the fixed mirror a reflexion of the patient's left eye, and slides the movable mirror on the rod until it reflects the image of the right eye, directly under the image of the left, the vertical lines in the two mirrors being coincident and passing through the centers of the two pupils. The required distance is then read off on the graduated scale. The whole operation is finished in a few seconds and the operator depends on his own eye, instead of on the answers of his patient.

Barnesville, Ga., May 5, 1894.

Editor Ophthalmic Record:

Dear Sir: As my business duties prevent not only the pleasure I formerly enjoyed in writing for the journals, but also so fully occupy my time that I have little time for professional work, yet in spite of the unpleasant fate of having the presidency and management of a banking institution forced upon me in consequence of the death of a relative a year and a half ago, I still enjoy reading the journals, and take comfort in the prospect of being able in the near future of resuming my place in the ranks of my loved profession, which is dearer to me than any such Shylock-appearing occupation as money-lending. I manage to steal time to do an occasional operation, and I have been impressed with the fact that when we do but little, how much better we can do for our patients.

As I haven't read a great deal lately, I hardly know what is going on. I understand that it has gotten to be the fashion to give the patient, after cataract, more and more liberty; operating on them at the office and sending them home in hacks; doing the operation with the patient in a sitting posture; dressing with hardly any bandage, etc., etc. I have never yet done anything of this kind, and hardly think I ever shall. Cataract is, in my humble opinion, too much of a capital operation of the eye for such chances to be taken. But as to the time of dismissal of the patient: In the last three cases of extraction made by me I was so fortunate as to have such perfect union and rapid recovery that I sent one old man, aged seventy-six, home in ten days after the operation, with the eye perfectly free of inflammation, and inside of thirty days he had resumed his occupation of driver (mail carrier). The second, an old man of eighty-one I sent home with the eye free of inflammation, in fourteen days. The third case, and the one most free of even redness of the eyeball, was an old man, eighty years old, whom I sent home on the eighth day after the operation. This may sound rash, but my reason for risking his removal was because he had no control over his bladder and bowels, and realized that he was such a heavy care to the people he was stopping with in town that I saw he was fretting to go home, and seeing that his eye had healed perfectly, and the ball and pupil perfectly clear, I allowed him to go.

All these cases were successes and had good vision. I made in all an iridectomy, as I have tried the operation without iridectomy about a dozen times, and have decided that I can do better for my patients by making the iridectomy. I attribute my success and the rapid recovery in these cases to my plan of simply bandaging up the eye and then *letting it entirely alone*, except to place fresh pedget of absorbent cotton over the lids every day for five days. Not a drop of Atropia solution was put in the eye after the operation. Neither did I examine the eye until the sixth or seventh day. If they had paid, of course I would have had to do something else. I am sure I have seen many successfully performed extractions fail simply from the dropping in of Atropia solutions once or twice a day after the operation, all the asepsis I observed was to wash off the patient's face with clear water, and dip all the instruments used in boiling water just before operating. I hope to meet you, brother editor, and many others of our colleagues from this country at the International Ophthalmological Congress, which meets in Edinburgh, August 6th to 9th. As I expect to spend the summer months in study abroad, I count upon being there.

Fraternally yours,

R. O. COTTER.

A CASE OF CHOREA CAUSED BY GLASSES.

A. G. ALDRICH, M.D., Anoka, Minn.

In March, 1893, a gentleman brought me his little daughter, Maud H., aged nine years, to be treated for acute catarrhal conjunctivitis. It was a simple case, and as it responded immediately to the treatment, I gave the case no further thought. In four weeks she again appeared at my office; this time suffering from a twitching of the eyes and facial muscles.

I immediately made the diagnosis of chorea, and referred the case to Dr. Flora L. Aldrich for treatment, who confirmed my diagnosis, and in less than two weeks a general violent chorea supervened. Carefully and thoroughly the prescribed treatment was carried out. The little girl improved at the end of four months in every way except the facial spasm, which was worse than at the beginning of the treatment. The etiology had been carefully looked into, and there was no history of hereditary chorea, rheumatism, infectious disease, injury or fright, and all conditions whereby a possible reflex spasm could occur except that of the eyes, and discouraged at the result after so much study and careful treatment, the Doctor referred her back to me for an examination of the eyes to ascertain if possibly there could be present ocular defects sufficient to keep up this marked facial spasm.

Skeptical in regard to ocular troubles causing chorea, I proceeded to make the requested examinations, and found a slight hyperopic astigmatism of 0.5 D. She did not complain of headache, could see well, and had never had any trouble with her eyes except the conjunctivitis above alluded to. Reluctantly I prescribed cylindric glasses and discontinued all other treatment.

In less than two weeks there was scarcely any spasm of the facial muscles, and in two months the little patient had entirely recovered. I see her frequently and do not observe any choreic movements. She still wears the correction given her, but as yet has not returned to school. In my opinion the ocular defect was the cause of the chorea, and the cylinders the cure.

ANALYSIS OF THE RELATIONS OF THE DOUBLE IMAGES IN PARALYSIS OF THE OCULAR MUSCLES.

By GEORGE T. STEVENS, New York.

The procedure of determining, in case of paralysis of one or more of the eye muscles, causing diplopia, the exact muscle at fault, is often a source of perplexity to the oculist. Especially is this the case when one of the four oblique muscles is the seat of the affection.

In the following table of analysis of the relative positions of the double images, in case of paralysis of a single muscle only, I have attempted to condense the various phenomena of diplopia, into a few easily remembered principles.

By means of this formula, one may quickly establish a diagnosis so far as the relation of the double images is concerned.

GENERAL SCHEME OF DIPLOPIA IN PARALYSIS OF THE OCULAR MUSCLES.

Diplopia caused by lateral rotation in the median plane:

- Images homonymous, paralysis of the externus of the eye toward which the rotations cause the greatest separation of the images.
- Images crossed, paralysis of the internus of the eye toward which the rotations cause the least separation.

Diplopia induced by vertical rotations above the median plane:

The highest image belongs to the affected eye.

Images homonymous, paralysis of the inferior oblique of that eye.

Images crossed, paralysis of the superior rectus of that eye.

Diplopia induced by vertical rotations below the median plane:

The lowest image belongs to the affected eye.

Images homonymous, paralysis of the superior oblique.

Images crossed, paralysis of the inferior rectus.

Co-existing exophoria of sufficient degree may cause the images in paralysis of the obliques to become crossed, and esophoria, in a like manner may cause the images in paralysis of the superior and inferior recti to become homonymous.

In such case diagnosis may be aided by the tilting of the images. If the tilting of the upper end of one image inward increases with the rotation above or below the median plane, paralysis of the rectus muscle is suggested.

If the tilting of the upper end outwards increases with the rotation above or below the median plane, paralysis of one of the obliques is suggested.

In all cases of paralysis of eye-muscles, the restriction of rotation of an eye in either direction is, of course, to be regarded as of primary importance in the diagnosis.

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G. C. SAVAGE, M.D., Editor and Publisher,

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American Medical Association.

The San Francisco Meeting has come and gone, and there are many reasons for believing that it was a pleasant and profitable one. The next meeting will be held in Baltimore, and Dr. J. J. Chisolm, well known to all our readers, is chairman of the committee on arrangements. We can very safely predict this far ahead that those who may attend that meeting will be well cared for.

We had expected to be able to publish in this issue a brief report of the work done in the Section of Ophthalmology, but the representative of the RECORD, from one cause or another, has failed in the duty assigned. Being a young man, he most likely found the California young ladies so pretty and entertaining that most of his time was devoted to them. So all we can publish about the Section is what has been published relative to its organization for another year. Dr. Edward Jackson, of Philadelphia, is Chairman of the Section, and Dr. H. V. Wurdemann, of Milwaukee, is Secretary. These two confreres will undoubtedly exert themselves to make the next meeting one of the best.

The next issue of the RECORD will contain Dr. Price's report of the scientific work done in the Section of Ophthalmology at

San Francisco, and later we hope to be able to publish abstracts of some of the papers read. We are sorry to have to state that we have been disappointed in our efforts to secure a full report of the discussions for publication. Though disappointed so far we are still making efforts in the direction of obtaining them. If the scientific work of the Section is not shown up in the RECORD this year as in the years that have gone, we will not be to blame.

Volume IV. of the Record

Begins with this issue. That good has been accomplished by the three volumes that have already appeared is evident. Many letters, from men capable of passing judgment, have commended the practical nature of the RECORD. Contributors have been kind both to the editor and to the readers, by both of whom their contributions have been appreciated. The material for publication has been abundant, and the prospects are that there will be no falling away in that line. That the good work may continue, we earnestly solicit such papers for publication as have for their aim the advancement of the science and practice of Ophthalmology; and we promise as speedy an appearance in print as may be possible. Any paper setting forth the results of original investigation, and for which the author's claim for credit should be speedily presented, will appear in the issue following its receipt. Any writer who may wish to controvert the teachings of any contributor will receive respectful consideration. The RECORD aims at the confirmation of what is true, and the refutation of what is erroneous. The writer who presents a truth deserves but little more than the one who opposes error.

As will be seen this issue of the RECORD appears in new type. The size of the journal will continue the same—forty pages of reading matter in every number—and the subscription price will remain two dollars.

Anomalies of Refraction and of the Muscles of the Eye.

The above is the title of a book of 300 pages by Dr. Flaval B. Tiffany, of Kansas City, Mo., recently published by the

Hudson-Kimberly Publishing Company of that city. While the author does not claim that he attempted to treat exhaustively the subjects of ametropia and heterophoria, he has, nevertheless, given us a volume that contains a great deal. The beginner in ophthalmology will find it helpful; and the one long in the practice of this branch of medical science will find that his memory of the principles involved will be refreshed as he reads. Many of the illustrations serve a good purpose. Some mistakes exist in the text, which have been kindly pointed out by other reviewers, and no doubt the second edition will show them corrected.

Some one has truthfully said that the whole subject of errors of refraction will have to be re-written; and the same might have been said of heterophoria. A new book devoted to an exhaustive discussion of these two subjects would have a great sale, and if properly written would make the author immortal.

Dr. W. T. Briggs.

The death of Dr. W. T. Briggs, which occurred in this city on June 13, 1894, has taken from the ranks of the medical profession one of America's greatest surgeon's. At the time when surgery included everything he was an expert operator on all parts subject to surgical skill, including the more delicate operations on the eye. He continued to do successfully the operation of extraction of cataract until about ten years ago, and gave the operation up then, not because of an unsteady hand, but because he considered that the oculist ought to he better qualified for such operations than the general surgeon.

The Eye and Ear Clinic.

Is the name of a new quarterly soon to be issued by Dr. Tiffany, of Kansas City. This will make the eighth journal devoted largely to the eye, published in English. Of these more than one-third have their home in one State—Missouri. We wish this new candidate for the favor of oculists well.

DEPARTMENT OF

Otology, Laryngology and Rhinology.

GEO. H. PRICE, M.D., Editor,
621½ Church Street, Nashville, Tenn.

TANSLEY'S CUT TO PREVENT MASTOID TROUBLE.

By Wm. D. BABCOCK, A M , M.D.

Professor of Laryngology and Rhinology, Medical Department of the University of Southern California.

Schwartz, in 1868, recommended paracentesis of the membrana tampanum in cases of acute inflammation of this structure, in which it takes on rapidly great swelling, and a dark bluish-red color in the posterior upper segment, and in which there is great pain that the usual remedies cannot relieve.

Bryant in his articles on the topography of the Normal Human Tympanum, Archives of Otology, vol. xix, page 217, and Blake's article on the Reduplication of the Tympanic Mucous Membrane, vol. xix, page 209, show how a very little swelling of these parts or folds will shut off the upper part of the drum cavity from the lower. Clinicaly it is a truth that inflammations of the lower part of the drum cavity with perforations do well with little or no treatment, while with inflammation of the upper cavity we have the long persistent suppurrative process difficult to control. It is on account of the sequellae of the inflammations in this part of the drum cavity that we have had in the last few years so many operations suggested for the removal of the bones of the ear, with the single exception of the sclerotic condition, in which case there is neither perforation or suppuration. The inflammation being confined to the upper posterior segment, the history is about this: The folds of the mucous membrane become swollen shutting off the upper part from the lower, the tention of the upper part increases, and as the upper and posterior part of the cavity (the attic) is bone, the flaccid membrane or superior portion of the Tympanum bulges outwards making a swelling like a miniature breast. The mucoperiosteum being thin becomes loosened from the bone and the inflammatory process extends in all directions, but mostly along the upper and posterior part of the external meatus. The swelling fills almost the cavity of the external meatus. Thus we have a periostitis. The examination shows the upper part of the drum membrane swollen, and of a dark red color. The upper part of the external meatus sometimes is also swolled, so much so that the tympanum is hid from view. In some cases the swelling can be lifted up with a probe away from the membrane. The swelling has the looks of a small red polyp; in fact, in one case it bulged so that I snared a piece away. The lower part of the drum membrane has the appearance of being indrawn, and has usually a pink color which is caused by the inflammed mucous membrane of the cavity showing through. Having in these cases a true periostitis the indications are plain. Relieve the tension. It is the cut advocated by Dr. J. O. Tansley of the Manhattan Eye and Ear Infirmary in these cases that caused me to head my paper as I have. Most of the writers say, puncture only. Pommery, Ed. 1883, page 222, advises making a cut of not over ⅛ inch in length. Gruber, 1st Ed., says: "The incision must not be made too small." Dr. Tansley advises the use of a Graefe's Indectomy knife, and to make the puncture in the upper and posterior quadrant pushing the knife in until you feel the bone on the rear wall of the tympanic cavity, then depress the handle and cut outward for at least ¾ inch keeping the point of the knife against the bone all the time. This brings the incision well into the external meatus and almost the whole length of the bony portion. In every case denuded rough bone will be found. Dr. Tansley claims, and I agree with him, that the invasion of the mastoid cells can be prevented by this large cut in a large number of cases. Dr. Tansley has a much smaller per cent of mastoid cases to his credit in the records of Manhattan than any of the other ear men there. I can testify to the case of making the cut, the relief of pain to the patient, and to the rapid stopping of puss formation.

Read at the California State Society Los Angeles, Cal., April, 1894.

A CASE OF ANTRECTOMY FOR THE RELIEF OF CATARRHAL DEAFNESS.

By W. H. BATES, M.D., New York.

Politzer, in his work on the ear, makes the statement that in chronic suppuration of the middle ear the mastoid cells are usually diseased. If chronic suppurative catarrh can extend to the mastoid, the same thing may occur in chronic dry catarrh. Lane in Knapp's Archives of Otology, Vol. xxi, No. 2, page 118, recommends antrectomy as a treatment for chronic purulent otitis media and records good results. If antrectomy was beneficial in suppurative otitis, it might be also beneficial in catanhal otitis—and so the operation was performed.

September 1st, 1891, the patient was first seen. The patient was a widow, aged thirty-three, who had complained of progressive hardness of hearing since she was 15 years old. She had ear ache at times. Right watch $\frac{12}{48}$, left watch $\frac{9}{48}$. Politzeration improved the hearing. Bone conduction was better than aerial conduction in both ears. She had no tinnitus. The nose was open on both sides. Both drum membranes were sunken. The malleus handle was displaced backward in both ears, more decidedly in the left ear. The patient was treated by applications of nitrate of silver to the vault of the pharynx to relieve the eustachian catarrh. Politzeration was also employed.

September 30th, right watch $\frac{38}{48}$, left watch $\frac{20}{48}$. Has tinnitus in both ears. Hearing improved by scraping the vault of the pharynx.

May 9th, 1892, Right watch $\frac{34}{48}$, left watch $\frac{30}{48}$. Hearing was worse after inflation. The tinnitus was less.

July 12th, Antrectomy was performed under ether on the left mastoid. The incision through the skin was about an inch long and was made $\frac{1}{4}$ from the junction of the auricle to the bone. The antrum was opened close to the external auditory canal. The size of the opening was half an inch in its horizontal diameter and about one quarter of an inch in its vertical diameter. The outer table of the antrum was thin. The antrum cavity was quite large and the cells perfectly dry. The posterior wall of the external auditory canal was removed down to the level of the drum membrane and the cavity of the antrum made continuous with the external auditory canal. Antisepsis was not strict. The hemorrhage was slight. The patient stood the operation well. Time of the operation was one and a half hours. The wound was packed with bichloride gauze and vaseline after dusting on the wound powdered iodoform. The usual bandage was applied.

July 17th, Removed the dressing. The skin wound had nearly closed and had to be reopened with scissors. There is some oozing of blood from the external auditory canal and from the opening in the antrum. The wound feels slightly sore. Tinnitus has annoyed her slightly in the right ear. She has no tinnitus in the left ear. The left ear feels stuffy and the hearing is poor. The same dressing was reapplied.

The patient was seen about three times a week. The wound healed without suppuration—the discharge was never offensive. The antrum cavity was filled by profuse granulations.

September 23rd, Right watch $\frac{10}{48}$, left watch $\frac{12}{48}$. The left ear feels more open, and hearing for conversation is improving. No treatment of the throat or inflation since the operation. Tinnitus is present only in the right ear. The wound is closing.

November 28th, Right watch $\frac{18}{48}$, left watch $\frac{24}{48}$. The left ear has better hearing than the right. The wound has entirely closed.

The patient was seen at irregular intervals. The improvement in the hearing of the left ear did not continue. Treatment of the throat and inflation were resumed.

September 25th, 1893, Right watch $\frac{20}{48}$, left watch $\frac{12}{48}$. After inflation the hearing is better in both ears. The tinnitus is constant in the right ear and occurs irregularly in the left ear. The scar which resulted from the healing of the incision behind the auricle is not noticeable. There is a shallow depression where the bone was removed.

CONCLUSIONS.

1st. The first effect of the operation was to lower the hearing.

2nd. The hearing was decidedly improved after healing had taken place.

3rd. The operation did not improve the hearing permanently.

64 East Fifty-eighth St.

THE

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THE NECESSITY FOR COMPLETE SUSPENSION OF ACCOMMODATION BY MYDRIATICS IN THE ADJUSTMENT OF GLASSES.*

By G. C. SAVAGE, M.D., Nashville, Tenn.

Professor of Ophthalmology in the Medical Department of Vanderbilt University.

If the accommodation could be suspended instantaneously, and then, after the work of refraction has been accomplished, could it be as speedily restored to the normal, who and where is the Oculist who would not exercise such magical power in *all* his cases of refraction? If the exercise of this supposed magical power would be justifiable, then there must be some strong reasons for using the means really at our command, for putting at rest the ciliary muscle when a focal error, whatever may be its nature, is to be corrected. It is the object of this paper to give the reasons that not only justify, but actually demand, the use of the mydriatic in refractive work.

For the sake of fairness, the reasons against the use of the mydriatic, except in rare and remote instances, will be given:

1. It interferes with the business of the patient. This of course applies to the banker and the butcher, to the lady whose

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*Read in the Section of Ophthalmology of the First Pan-American Medical Congress September, 1893.

business is to read the latest novel, and the girl who has to sew for her daily living. In fact about all of our patients need the eyes for near use at least a part of every day.

2. The general inconvenience to the patient, leaving out the question of using the eyes in near work. The pupil being dilated a flood of light enters the eye, and the patient is annoyed by the dazzling it produces; and, except in myopia, there is always an attendant dimness of both distant and near vision, greater or less in degree. In rare instances there is a slight toxic effect.

3. The chromatic and spherical aberation, resulting from the dilatation of the pupils, is not only annoying to the patient, but is otherwise undesirable.

4. The operator is delayed, and his time is, of course, valuable.

5. There is the danger that, in old people, the mydriatic may excite the glaucomatous state.

6. Glasses prescribed without a mydriatic are often comfortable.

7. One other reason which has been advocated, but which is absurd on its face, is that the error, especially if it be astigmatism, cannot be as thoroughly corrected when the eye is under the influence of a mydriatic as when it is not.

In presenting the numerous reasons for the use of the mydriatic in the work of refraction, all the reasons above given against its use will be met.

While, in some cases, glasses may be prescribed simply to sharpen vision, it must be confessed that the greater number of cases coming under the observation of the oculist are persons who suffer because of strain. This leads us to enquire, "What is eye-strain?" A clear understanding of what the answer to this question should be will go far towards settling the question of the proper line of practice intended for its relief. None will controvert the statement that

EYE-STRAIN IS MUSCLE STRAIN;

and that the muscles concerned in the visual act are: first, those regulating the quantity of light admitted into the eye and the direction of its rays—these are the two sets of fibers in the iris and the ciliary muscle; second, the extrinsic muscles—the recti and the oblique—which are concerned in directing the visual axes, and in keeping the naturally vertical meridians of the corneas so related that images may fall on corresponding parts of the two retinæ. Muscular *action* is not muscle *strain*, unless the action is either too prolonged or too great for the inherent power of the muscle. Some, by their teaching, would show that only the ciliary muscle is susceptible of strain; and that ciliary strain alone is capable of bringing into existence that long train of nervous phenomena with which the oculist and, of late years, the neurologist are so well acquainted. There are others who are accused of believing and teaching that the extrinsic muscles are alone susceptible of that fatigue which brings discomfort, in varied forms, to our patients. There are not a few, however, whose practice is governed by the sounder doctrine that both the intrinsic and extrinsic eye-muscles may be put to the necessity of doing more work than their strength will bear; and that the consequent strain, whether in the one set or in the other, or in both at the same time, will develop headache, vertigo, confusion of thoughts, and a host of other phenomena. While glasses, prescribed for the correction of focal errors, were once thought capable of curing all symptoms depending on eye-strain, the time is now when no such claim can be sustained. Lenses that give a perfect correction of existing focal errors may, in some instances, augment, rather than allay, the suffering due to eye-strain. Such patients would be better without lenses until the chief cause of suffering, in the individual case, has been found and, by the proper treatment, cured.

But I am not one to cry out against the prescribing of glasses. My wearing lenses is sufficient evidence of my regard for, and my appreciation of them. Properly determined, scientifically prescribed and correctly worn, they do only good. But, in prescribing glasses, we must take into consideration both the focal error, and the muscular adjustment—particularly the adjustment of the internal and external recti. Since glasses can do more than relieve ciliary strain—they can, if properly selected, relieve strain of the internal and external recti independent of prismatic effect;* also strain of the oblique muscles in cases of oblique astigmatism—they should be scientifically prescribed, after a most pains-taking study of the focal error and the muscular adjustment.

For the present, fixing our attention on focal errors, we find that there are these: myopia, hypermetropia, and the several kinds of astigmatism. In emetropic eyes there is no strain, in the proper sense, when used in moderation.

In simple myopia of 3 D. or more, the ciliary muscle is never called into action and, therefore, can never be strained. If such eyes give annoyance, other than dimness of distant vision, the cause must be sought, and will be found, in the relationship of the extrinsic muscles.

In simple hypermetropia the ciliary muscle, during waking hours, is ever acting until quieted by age. Any action of the ciliary muscle for sharpening distant vision is strain; and in such eyes over-action (strain) is necessary in order to good near vision. In some of these cases the ciliary muscle is hyperdeveloped, the centre controling it has an abundant supply of nerve-force, and there are no symptoms resulting from the strain. Other hypermetropes are not so fortunately constituted, and the ciliary strain, caused by the refractive error, is felt in some form or other.

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*See Ophthalmic Record No. 1. Vol. 2.

In astigmatism, of whatever kind, with the principal meridians in the vertical and horizontal, or if oblique, the obliguity is in the same direction and at the same angle in the two eyes, the astigmatic refraction also being equal in the two eyes, there is only ciliary strain directed against this refractive error. As to the character of the effort made by the ciliary muscle there is some difference of opinion. Whatever may be the nature of this strain, it is capable of correcting wholly only the lower degrees of astigmatism, and only a small part of the higher degrees of this error; but that the effort is being continually made, for distant and near vision, in cases of hypermetropic and mixed astigmatism, also in myopic astigmatism when near vision is attempted, there can be no doubt. This effort is *strain* if the action is equal and simultaneous in all parts, holding the focal interval on the retina, or adjusting the rays of first one principal meridian and then those of the other, as vertical or horizontal lines may be viewed; it is *strain* if the ciliary muscle acts, as described by Martin, in sections the one opposite the other, thus, by altering curvature, developing a lenticular astigmatism correcting in whole or in part the corneal; it is also *strain* if the longitudinal fibers of Bowman are alone concerned in the effort of correcting the astigmatism, by tilting the lens on an axis in a plane with the corneal meridian of greatest refraction, thus producing a lenticular astigmatism counteracting to some extent the corneal. In oblique astigmatism, as usually encountered, there is a demonstrable necessity for action (strain) on the part of the obliques,* which, in these cases, is a factor added to the ciliary strain excited by the astigmatism. The strain caused by astigmatism is nearly always a source of annoyance to the patient and should, in all cases, be fully corrected, regardless of any and all other conditions.

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*See Ophthalmic Record No. 1, Vol. 1.

Ciliary strain is an effort on the part of the ciliary muscle to increase the refractive power of the lens, as in hypermetropia, or to render it astigmatic, by tilting or otherwise, for the correction of a corneal astigmatism. This action, or these actions, of the ciliary muscle is, from necessity, brought into existence in very early life, and because of daily repetition becomes a fixed habit of the muscle—a habit whose existence continues, in nearly all cases, for a time after the cause for it has been taken away, by properly adjusted lenses. If this is true who knows that his work has been correctly done, when he undertakes the correction of a refractive error, while the ciliary muscle is allowed to continue at its old work? That glasses thus fitted often (for a time) give satisfaction is but a verification of the old adage that "Guess work is as good as any when it hits."

How often do we find ourselves declaring what is a truth, that Ophthalmology is more nearly a pure science that any other department of medicine? And is not this true mainly because of our perfect knowledge of the refraction of the eye and the conditions that result from errors of refraction? If there were no modifying conditions, nothing could be more scientific than the full correction of errors of refraction, which could not be done accurately without first putting at rest the self-correcting power, the ciliary muscle. Since these modifying conditions are known and can be removed, it is the plain duty of every Oculist to determine, by a most thorough and pains-taking examination, under the only favorable condition, suspension of accommodation, what the refractive errors are, even though, because of the existence of some known muscle error, he might know that it would not be proper to give fully correcting lenses at that time; for having cured the muscle error, his record would enable him later to give the full focal correction. There is no condition of the extrinsic muscles which would be disturbed by a full correction of any astigmatic error; there is no astigmatic error which may not be partly concealed by ciliary strain.

In the work of refraction how fortunate for science and practice, for patient and practitioner, that we have at our command

MYDRIATICS,

whose effect is to temporarily suspend the self-adjusting power of the faulty eye, during which period artificial correcting means may be accurately determined.

While a mydriatic does not, in the least, interfere with any of our objective methods of examination, it gives greater accuracy to most of these. All must confess that the

OPHTHALMOSCOPE

can measure more correctly the refractive error of an eye, when under the influence of a mydriatic, than when it is not. The man most skilled in estimating the refraction of eyes, by means of the ophthalmoscope, must confess that it took both time and practice to enable him to voluntarily suspend his accommodation, with his eye on the dark side of the instrument; then how can he expect the patient, whose eye is on the light side of the instrument, to learn in a minute to suspend an *involuntary* power, one that is being stimulated into activity by the light that is thrown on the retina? When there is forced suspension of accommodation (by a mydriatic) in the patient's eye, and acquirred suspension of accommodation (by practice) in the observer's eye, then there can be some degree of accuracy in the measurements of the ophthalmoscope; otherwise there cannot be.

The valuable objective examination of

SKIASCOPY

could not be so well made, nor could the results be so accurate, if done when the eye is uninfluenced by a mydriatic. Properly practiced, under favorable conditions, skiascopy, in addition to detecting and measuring myopia and hypermetropia, shows quickly the existence of astigmatism, the kind and the quantity; and, approximately, the location of the principal meridians. A method capable of doing so much should not be interfered with by an active ciliary muscle and a contracted pupil.

When we come to the method of

OPHTHALMOMETRY

we find that an active accommodation neither hinders nor helps. Since the ophthalmometer deals only with the cornea, we know that its findings must be the same both with and without a mydriatic; for a mydriatic can effect no change in either the corneal curvature or the corneal reflection. If no effort on the inside of the eye were ever made for the correction of corneal refractive errors, as is true in the aphakial eye, and all errors of refraction existed in the cornea alone, we would then have, in the ophthalmometer, an instrument infallible in its findings; and the mydriatic could be sent into "innocuous desuetude." Although ciliary action prevents our relying implicitly on the ophthalmometer, it is, never-the-less, a great aid in refractive work. Those who bought this instrument and then consigned it to the attic, if they will only bring it down again and cultivate its acquaintance a little more closely, will find in it a worthy friend. Those whose enthusiasm has led them to trust this instrument implicitly, will, on more careful study, find themselves victims of misplaced confidence, for the reason already given in this paper. The great sin for which the ophthalmometer will have to account is that its introduction led to a vigorous renewal of the effort to discard the mydriatic in the work of refraction.

If the mydriatic is an aid in objective examinations, and ought not to be dispensed with, it is still more essential when the subjective methods are to be resorted to, as they must be, if we aim at accuracy in our work.

In our subjective tests, there are causes for error, other than activity of the accommodative muscle, but unfortunately none of them are so easily removed as the latter. For the stupidity of the patient under examination, there is no perfect remedy; for the carelessness and haste of the operator, there is a cure in the combination of knowledge of the conditions under study and a determination to do the best possible under the circumstances.

When we resort to the use of the

LENSES OF THE TEST CASE

our aim is to prove the "findings" of our objective tests. If the fixed habit of strain is not suspended by a mydriatic, though we labor long and earnestly, we can never be certain that what we have done is absolutely correct. No one has ever yet learned the art of coaxing the ciliary muscle into a state of rest. When capable of acting, it is always trying to correct the error which your lenses are searching out. This subjective test, when unopposed by ciliary power, is soon satisfactorily ended.

If the need of a sphero-cylinder has been determined, and yet there is a "modicum of doubt" as to whether the spherical part should be diminished, and the cylindrical increased, in strength, or *vice versa*, the confirmatory agency is the

JACKSON SPHERO-CYLINDER,

the use of which can be depended on only when there is suspension of the accommodation.

If a perfect knowledge of the full error of refraction in every case is necessary, and this knowledge can be attained only by the suspension of the accommodation, then the reasons against the use of the mydriatic, can be easily disposed of.

As to the interference with the business of the patient, superinduced by the mydriatic:—He comes to the oculist because of the fact that his eye-strain interferes with his business in one way or another. Relief is what he needs and what he should have—relief in the fullest sense of the word—not present relief only, but relief for the future as well. When told that his trouble is due to eye-strain, he naturally infers that if the cause of that strain is removed, freedom from trouble would follow. He comes, possibly, from a great distance, and, though his business may need him at home, he is off seeking comfort, worth more to him than gold. He is a willing subject, and complains at nothing that is needful to be done. He is a young man—old men may suffer with eye symptoms brought on by strain of the extrinsic muscles but not from ciliary strain—and his accommodation is active. This must be suspended if the full error is to be known. If he is left to choose, after a fair statement of his case has been made, he will agree to the loss of time that must follow the use of the mydriatic, for he wants the work done correctly. Methods and means that are correct for patients from a distance are correct for home people. As to the amount of interference with business, the difference is decidedly in the favor of the home man. Besides, the business man being a sensible man, will not complain at a loss of time necessary in order that relief may come, for he remembers how his troubles have, at times, incapacitated him for effective work. There are few whose work in bank, store or elsewhere, cannot be done, for a reasonable time, by a substitute. What is true of the man of business is true of all patients, lawyers, doctors, school-teachers, artists, sewing girls, etc. But the necessary loss of time from the proper use of a reliable mydriatic, need not exceed twenty-four to forty-eight hours. If it were necessary, the patient might be sent at once from the Doctor's office to the counting room, or wherever his duties might call him. Of course near-seeing so quickly done would have to be effected by means of a temporary pair of lenses.

The mydriatic whose power is effective and yet, as compared with atropine, evanescent, is the one that should be chosen. There are few ciliary muscles that will not respond to a solution of Hydrobromate of Homatropia of the strength of one-third grain to twenty drops of water, ten drops of which, drop by drop every five minutes, should be put in each eye. In ten minutes after the last installation the study of the refraction can be confidently commenced. The work completed by both subjective and objective tests, within an hour and a half all told, a few drops of a 1-500 solution of esrine may be used, the same to be repeated the next morning early. The patient may then be sent about his business. By the next morning the effect of the mydriatic is entirely gone.

As to the general inconvenience to the patient: This can be readily borne, or modified by smoke-glasses, etc. Systemic effects are rare and can be combatted by appropriate remedies —brandy and morphia.

As to loss of time to the operator:—This is a myth. While the muscle test and the correction of the refractive errors must be done by the operator, he can safely commit the use of the mydriatic to the office girl whose time is not so valuable as his own. This method, too, is restful both to the Doctor and the patient; for the muscle tests should always be made when the eyes are uninfluenced by a mydriatic. After the eyes are brought under the influence of the mydriatic, the subjective and objective examinations of the focal errors are soon over, and the patient does not have to be re-examined on the next day, nor at any other time, as a rule.

As to the objection that the mydriatic may increase tension to the point of exciting an attack of Glaucoma:—This objection can weigh but little when we consider that this danger exists only in persons beyond middle life: and that, in these patients, the ciliary muscle has lost more or less of its power, and a weak mydriatic serves to completely suspend what remains. In these cases, especially if the patients are beyond fifty-five years, the prime object is not to act on the ciliary muscle, but to dilate the pupil, in order that a thorough examination of the fundus may be made for the detection of central choroiditis, so common in old people; also that the periphery of the lens may be examined for beginning opacities. When these conditions are detected early, as is well known proper therapeutic means may check their progress, and make it possible for the patient to have comfortable vision during the remainder of life. Through the small pupil of the old, these changes could not be readily detected. After the proper glasses have been determined, and the fundus and lens have been thoroughly investigated, the myotic should never be omitted if the patient is beyond middle life.

While advocating the complete suspension of the accommodation, that full knowledge of the refractive errors may be attained, and made a matter of record, I would not be understood as advocating that the myopic and the hypermetropic refraction should always be fully corrected in every patient, at the beginning. On the contrary, in the light of our present knowledge, such practice should be avoided, not only for the comfort of the patient, but also for the credit of the practitioner. In the present state of our knowledge, there is not a single reason for not correcting fully all the astigmatism that may be found in any case; but not so with the hypermetropia and myopia that may complicate it. The relationship between the external and internal recti should always be known before prescribing convex or concave spherical lenses. This should be determined when the eyes are uninfluenced by a mydriatic.* The superior and inferior recti and the obliques may not be consulted, when glasses are to be prescribed.

In prescribing spherical lenses for

ESOPHORIC CASES

there is an absolute need for the mydriatic in its full power, regardless of whether the refraction is hypermetropic or myopic. If hypermetropia is associated with esophoria, the accommodation should be fully suspended, not only that the whole of the refractive errror may be known, but that it also may be corrected fully. Such glasses will cure a part (the pseudo-esophoria) of the esophoric condition, if not all. As I have been able to show in a former study, the esophoria associated with uncorrected hypermetropia is not all due to the intrinsic power of the internal recti. Further observation leads me to suggest that, for every dioptre of hypermetropia in each eye, there is a half degree of pseudo-esophoria (1 D. of H. in each eye would give 1 degree). What esophoria is left after giving a full correction of the hypermetropia must be cured by operation or exercise, or by both. A full correction of the hypermetropia should always be given in cases of internal squint.

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*See Ophthalmic Record No. 11, Vol. 2.

When esophoria is associated with myopia, the mydriatic should be used to full suspension of accommodation,that the very great error of giving an over-correction of the myopia may be avoided. The exact correction should be known and recorded. The same may be prescribed for distant seeing without risk of adding a pseudo-esophoria to the true muscle error; but the fully correcting concave lenses should not be prescribed for near use, for the reason that the muscle error would be thereby increased.

When the esophoria has been cured the full myopic correction should be worn for all distances.

In prescribing spherical lenses for

EXOPHORIC CASES

there is an absolute need for the mydriatic in its full power, whether the refraction is hypermetropic or myopic; for it is in these cases that the true error of refraction is most likely to be concealed, because of the spasm of accommodation caused by the exophoria. Exophoria often causes emmetropic eyes to appear to be myopic; it renders latent the greater part of a hypermetropic error, and adds a pseudo-myopia to the real myopia. The mydriatic alone is able to show the refraction of exophoric eyes in its true state. Without it concave lenses will be selected by emmetropic eyes—not infrequently, under these conditions, hypermetropes choose concave lenses. While an over-correction of myopia should never be given, the *full* correction of a myopia associated with exophoria should always be prescribed, and the patient should be directed to wear these lenses for all purposes of vision.

While the hypermetropia associated with exophoria should always be known and recorded, the full correction should not be given—often no correction—until the muscle error has been cured by the means at our command.

Orthophoria is rare, but when it exists a full correction of any and all refractive errors should be given. That an over-correction of myopia and an under-correction of hypermetropia may be avoided in these cases, the full suspension of accommodation is essential.

Instead of using the mydriatic once in forty-six cases, have we not strong scientific reasons for using it forty-six times in forty-six cases?

The human eye remains a human eye under the influence of the mydriatic, except as to its focal adjustment; in this respect it is no more than a machine, and is susceptible of perfect measurement by means of our several objective and subjective methods. In no other way can accuracy be attained.

The unscientific cry of honest but misguided oculists, against the use of the mydriatic, is to the ear of the quack spectacle vendor a sweet sound which he attunes to his own profit, and to the detriment of the unsuspecting public. May it soon be heard no more in the land.

TWO CASES OF LESION OF THE OPTIC TRACTS FROM LA GRIPPE.

By S. MITCHELL, M.D., Hornellsville, N. Y

Oculist and Aurist to St. James Mercy Hospital. Consulting Surgeon to the Hornell Sanitarium.

There is, I think, no disease of modern times, unless it be syphilis, that has so much to answer for in the way of producing disabling lesions of the human form, as la grippe. It seems to have this reputation among the laiety, and the profession has not, and perhaps cares not, to dispute it.

At any rate this new scourge is giving the aged and respected "malaria," with his tottering step and wabbling jaw, a chance to get a little rest. And if at the same time it has robbed the careless practitioner, of a very servicable blanket with which he was wont to cover his ignorance, it has presented him with one just as good.

Several cases of various lesions of the optic tracts, the result of la grippe, have been reported, and I am sure many more have been met with by ophthalmologists in this and other countries. In the two cases detailed below, the ocular disturbance occurred in both during an attack of la grippe.

The first was that of a young married lady, aged twenty-two, quite poorly nourished and anemic, no history of any specific disease, who came under my observation March 8th, 1892, some months after the sickness, which was the cause of her ocular trouble. She complained of dimness of vision which had existed since the attack of la grippe, during the continuance of which she was taken suddenly one evening with intense pain over the left eye, followed almost immediately by blindness.

She informed me that she was totally blind for twelve hours following its onset, and during the next twenty-four hours she rapidly regained her sight, except for slight dimness previously mentioned. Her vision when first seen by me was $\frac{20}{20}$ with either eye, and J 3 was read with some difficulty.

The appearance of the fundus was the same in both eyes, marked paleness of the disk and slight contraction of the arteries, otherwise perfectly normal. No measurement of the field was taken at the first examination, but at a subsequent one it was, and hemiopia found to exist, affecting the nasal side of the right, and the temporal side of the left eye.

The treatment for two months was tonics and Potassum Iodide in increasing doses. One month after first visit central vision was $\frac{20}{15}$ in either eye, and J 1 was read slowly. Since the first two months I have had no opportunity to examine the eyes until within the past few days, when I found the condition exactly the same as described above. The hemiopia remains unchanged. I could not give her any assurance that it would ever improve. About the only discomfort complained of was the inability to read readily. For in reading she can only see the word which the eyes are fixed upon, or those to the left of it; all in advance are obscure. She thought if all her reading could be from right to left instead of from left to right she could accomplish it much more easily and rapidly.

The other case was that of a widow lady fifty-two years of age. About medium height inclined to be stout and plethoric. No history of specific disease. She remained in town purposely for treatment, so that I had a much better opportunity to study her case and to observe the changes than in the one just related.

She came from a neighboring town, about thirty miles distant, and I first saw her September 8th, 1891. Three weeks previous she was taken with la grippe, and for one week suffered severe pain in the head, mainly in the temporal region. The pain was accompanied by great intolerance of light.

She informed me that opiates were used freely to subdue the pain, and she was constantly in a darkened room. At the end of a week pain had subsided somewhat, and she then discovered that her sight had failed very materially. Two weeks later when I examined the eyes, her vision was as follows: V. O. D. $\frac{15}{30}$; V. O. S. fingers at one foot and only seen at the temporal side. The outlines of the disk of the right eye were very much obscured by the swelling, and while the retinal veins were very much disturbed and tortuous the arteries were scarcely perceptible.

The appearance of the fundus of the left eye was similar to the right. There was more swelling of the disk, and the dark tortuous veins were the only part of the fundus clearly descernable.

Several leeches were applied to both temples, a cathartic given, and the following order taken every four hours: Potass. Bromide, gr. xv; Potass. Iodide, gr. 1; Fluid Ext. Ergot, M viii.

September 14th, the vision of the right eye had diminished to $\frac{5}{200}$ that of the left remained the same. The Bromide and Ergot mixture was discontinued on this date, and the administration of Potassium Iodide begun in five grain doses three times per day, increasing the dose two grains daily until thirty grains at a dose was reached.

On September 19th the outlines of the disks of both eyes could be made out, but their extreme paleness awakened in my mind grave apprehension of total and irremidiable blindness as the final outcome. But these apprehensions were happily dispelled, as will be shown by the record further on. The veins still appeared large and tortuous and the arteries small. Vision recorded on this date was same as on the 14th inst, $\frac{1}{50}$ grains Strychnia Sulphate was given hypodermically at this visit, and continued once a day, slightly increasing the dose each day, untill October 12th. The use of a weak continuous current from a galvanic battery was also begun at this time and applied daily until my patient departed for her home on the 13th of October.

The first record of any improvement of the vision was made on September 21st, V. O. D. being $\frac{7}{200}$ and V. O. S. $\frac{3}{200}$. Five days later V. O. D. was $\frac{15}{200}$ and V. O. S. $\frac{12}{200}$. The next day V. O. D. was $\frac{12}{50}$ and V. O. S. $\frac{12}{70}$. From this date on the improvement was surprisingly rapid. Well marked improvement being recorded from day to day.

On October 7th vision was $\frac{20}{20}$ with either eye and with a + 2.25. J. 2 was read quite fluently.

There was one remedy employed in this case, when vision was the poorest, and the prospects of recovery seemed very poor indeed, that I have thus far neglected to speak of; that is the application of the galvano-cautery to the middle turbinated bones of both nasal cavities.

I discovered that there was considerable thickening and congestion of the mucous membrane covering them, and made one application to each at different sittings, in the following manner. After thoroughly cocanizing the parts, a flat electrode, heated to a bright red heat, was applied, and allowed to partially cool, when it would become adhered to the tissues. Then by pulling it away forcibly, quite free bleeding was produced.

Whether this rather novel method of obtaining counter-irritation and depletion had any influence for good on the happy outcome of this case, I am not prepared to say, but should a similar case fall to my lot to treat, I should not hesitate to employ this remedy.

This lesion that occurred in the first case was undoubtedly a circumscribed hemorrhage in the course of the left optic tract or in the region of the Corpora Quadrigeminia, or the Optic Thalamies on the left side, as the optic tracts have their origin in both of these bodies.

The other case was one of double optic neuritis, occasioned probably, by the extension of the inflamation from a basilar meningitis to the optic tracts and so on to the optic nerves and retina.

The neuro-retinitis revealed by the ophthalmoscope was unmistakable. And although the explanation given above of its origin must be a matter of inference, it seems to me nevertheless to be the true one. The week or more of unremitting pain through the temples, that preceded the failure of vision, gave evidence of the presence of an active inflamatory process going on at the base of the brain.

"CATARACT EXTRACTION AN OFFICE OPERATION."

By T. E. MURRELL, M. D., St. Louis, Mo.

Professor Ophthalmology Barnes Medical College.

Under the above title in the July number of this Record, Dr. S. Mitchell, of Hornellsville, N. Y., writes: "About a year ago, during a conversation with Dr. Lucien Howe relative to the care of patients after cataract extraction, he remarked that he thought the day not far distant when the Ophthalmologist would consider cataract extraction a suitable and safe office operation." The writer goes on to say "at that time he did not concur in the opinion," * * * "but in the light of a recent experience" he had changed his mind. He then cites a case where, almost as a matter of necessity, he performed extraction on an old gentleman in his office, and led him to his room, half a block away, and up two flights of stairs, and yet healing occurred without accident. Two weeks later he did discission in his office on the same eye and it turned out nicely. Since then he has performed one linear extraction and three suction opertions in his office and "can now see no reason why simple extraction, in the majority of cases, should not be performed in the office and the patient walk or ride to his home or boarding place afterwards." I am very glad the doctor has made this discovery on his own experience, but it is strange he should have overlooked all the literature that has appeared during the last five or six years on this subject. I have done extractions almost exclusively, of whatever nature, at my office and dispensary, and allowed the patients to ride or walk home, for the last seven years, and have time and again published articles in the journals, and read papers before the medical societies on the subject. My first paper before the Section of Ophthalmology of the American Medical Association, was read at Washington, in 1891, and appears in the transactions for that year, although I had before that promulgated my views and experiences in discussions before. At the Washington meeting no one agreed with me as to the safety of extraction in one's office and permitting the patient to ride or walk home, and one gentleman, since then, chairman of the Section of Ophthalmology, informed me that if I were in his country and took such risks I would soon have a suit for damages on hand. I have boldly practised and advocated doing extractions in the office whenever the patient is not crippled or infirm, making it difficult to get home unless I have been especially requested to go to the home to perform the operation, and I am fully persuaded in my own mind that it is a perfectly rational procedure. I am glad to be able to say that others are now doing likewise, mostly the younger surgeons, as the older are more fixed in their ideas; and I know several gentlemen who, having tested it, are much gratified with the results, and have full confidence in its safety. My friend, Dr. Wolfner, of this city, has during the past two years made perhaps fifty extractions at the Missouri Polyclinic, allowing the patients to go home to any part of the city, and requiring them to return to the dispensary after two or three days, to be seen. These visits they repeat as often as necessary until fitted with glasses and discharged. By way of digression, I will say, Dr.

Wolfner uses no bandages—only a strip of gold-beaters skin to close the lids. He tells me his simple extraction in his out-door patients have done as well as those operated and confined in the hospital wards. Five or six years ago Dr. Cheatham, of Louisville, published an article in which he stated he was doing extractions at the Medical College, and allowing his patients to go home. St. Louis covers a large territory, and some of my dispensary patients come five or six miles, yet I do not hesitate to perform extraction at the dispensary and allow them to go home. Instead of having them return in two or three days, I usually visit them, or have one of my assistants to do so. I am in inclined to think that undue exposure to the sun and glare of the sky three or four days after extraction is more liable to excite iritis than if the patient is kept quiet at home. I would call attention to an article of mine published in the October, 1893, number of the OPHTHALMIC RECORD, in which I strongly advocate the "simple dressing," that is, adhesive strips only to secure the lids, and offer an argument for the perfect safety of operating for cataract at one's office.

All operations on the eye are office or dispensary operations with me, and have been for many years.

I think DeHowe is right in his *propchtic* remark, but it lacks one important element of true prophecy, viz. it was enunciated after the *fact* had been well established and proclaimed from the house-tops. It partakes more of that class of prophecies whose fulfillment has the invariable accompaniment, "I told you so."

"CATARACT EXTRACTION AN OFFICE OPERATION."

By W. CHEATHAM, A.B., M.D., Louisville, Ky.
Professor of Diseases of the Eye, Ear, Throat and Nose, Louisville Medical College.

An article with the above title by Dr. S. Mitchell, of Hornellsville, N. Y., in the July number of the OPHTHALMIC RECORD, calls my attention to the fact that I wrote an article several years ago (1885), that was published in the *Archives of Ophthalmology*, Vol. xiv., No. 1, in which I reported twenty-four cases operated on at the college clinic. The report was as follows:

In the beginning of this paper I referred to the after-treatment, especially to posture for the first few days after extraction. I am inclined to believe that we keep our patients in bed too much. In coming to this conclusion, it is true I have but the twenty-four cases to draw from. These twenty-four cases are all that I have operated upon at the College. All of them, as I said before, had to either ride or walk, either immediately after the operation or the next day, from six blocks to six miles. Of these twenty-four extractions, twelve of them (six cases) were doubled; none of them were lost. Of these twenty-four, about eighteen had extremely poor accommodations after the operation. Many of them had not even a dark room. Four of them, no physician saw after the operation, until they returned to me the third or fourth week. These cases were not picked cases. Usually badly fed, and not near so promising as the others. Yet they show a much better result. As I before stated, I recognize the smallness of the number. Very few of the many traumatic cases I have, in many of which the trauma is much greater than that resulting from cataract-extraction, are put to bed, or even stay in the house. Most of them are treated as office patients, reporting there every one, two, or three days as I think necessary. Many of these cases of trauma are in elderly people.

Results in the twenty-four cases were as follows: $V = \frac{20}{30}$ three cases; $V = \frac{20}{40}$ seven; $V = \frac{20}{50}$ eight; $V = \frac{20}{70}$ four; $V = \frac{20}{100}$ two cases.

This number has now increased to fifty-three, with good results in all except two. These two I think will get good results by secondary operations. To be added to the above are two cases operated upon recently and kept in the "recovery rooms" of the college, and in the person of a colored boy eighteen years old, with congenital cataract, the eye not being over $\frac{2}{3}$ of the normal size, the cornea being exceedingly small; the other in the person of a man sixty years old, who would not lie down, who took his bandage off the first night and was found next morning at the window looking at the sun rise. He never wore a bandage after that; had some iritis but promises to get a good result. So Dr. Mitchell must go back farther than a year or two for precedence in this matter. Some one may have preceded me, but I am not aware of it. For some years it has been my intention to arrange an operating room at my office to do a majority of my surgery there. Again Dr. Mitchell refers to cataract extraction as the "capital operation of eye surgery." I have never thought it near so difficult an operation as an Iridectomy with a clear lens present.

Dr. T. E. Murrell, of St. Louis, Mo., has also written upon this subject urging its adoption. Of course all cases cannot be operated upon at the office, but a majority can.

A NEW PROCEDURE FOR REMOVAL OF THE CAPSULE IN CATARACT EXTRACTION.

Translated by Dr. Wendell Reber, Pottsville, Pa.

The optical integrity of that membrane which in artificially aphakial eyes separates the vitreous from the aqueous humor exerts a great influence on past operative visual acuity.

Aside from secondary cataract proper, there are often formed from the anterior capsular remains fine, pointed shreds throwing out from their borders strands of proliferating epithelial cells, which latter by traction on the posterior capsule cause folds in the pupillary area producing no inconsiderable hindrance to vision.

By means of feeble illumination with the ophthalmascopic mirror, these folds one clearly recognized.

A thorough removal of the anterior capsule from the pupillary area, with the clearest possible separation of the extracted portion, is therefore desirable, and beneficial to vision.

The use of especially constructed Pincettes (Förster, Dewecker, etc.,) enabling one to engage and extract a piece of the capsule brings us nearer to this desideratum, and has found favor rapidly with most surgeons.

However, with the pincettes alone we cannot always determine the exact form and size of the extracted piece and especially will ragged pointed edges frequently remain.

Moreover, in the presence of a tenacious capsule, it is frequently not an easy task to bring away a sufficiently large portion.

In view of these things I took the trouble several years since, (before the advent of the Capsule forceps or scissors) to exsect the desired portion of membrane and then withdraw it.

At first I adapted to this purpose Graefe's knife, which however, because of its straight blade, necessitated either extreme inferior rotation of the globe or considerable separation of the lips of the wound. Later I used a small pattern of the ordinary bent lance, which served the purpose much better, and in 1891 I had made my own device which has thoroughly satisfied me in its performances.

It has the handle and angle of the usual bent lance; the blade proper is rather longer, more narrow and somewhat tongue shaped; the cutting end of the blade is rounded and exceedingly sharp on each side of the end for a distance of about one sixth of the length of the blade. The knife is introduced after the iridectomy, along the inner margin of the calaboma, then carried down between the iris and lens without impinging on the latter, until the extremity of the blade has disappeared behind the pupillary margin when, with the most delicate pressure on the anterior lens surface, the knife is made to sweep outward to the outer calabomal margin and then withdrawn.

By this procedure one loosens a comfortably large portion of the capsule that can be readily seized and extracted "in toto" with Förster's Pincette.

Even with a tough membrane, by virtue of the sharp edge of the instrument, it suffices to make but the slightest appreciable pressure on the lens, for exsection of the capsule; in consequence of which, I have never, even with an atrophic zonule had to record a luxation of the cataract.

The excised capsular bit is placed in water where it spreads out, enabling one at a glance to estimate its size and form.

Whether the procedure would be applicable in simple extraction I cannot say, as I always operate with iridectomy, although I do not believe it would be contra-indicated in the former method. The danger of wounding the iris with the new knife is no greater than with other cystotomes, which rather favour luxation of the lens. The results are so satisfactory that I do not hesitate to commend the procedure in the warmest terms to my confreres.

Permit me to observe, however, that the successful use of this instrument demands practice; my colleagues will not, I hope, be deterred, by the first incomplete results, from probing further the true worth of the procedure.

From "Centralblatt fur Praktische Augenheilkunde," March '94, P. 70.

GALVANO CAUTERY IN BULLOUS KERATITIS.

By WALTER R. PARKER, M. D., Philadelphia.
House Surgeon Wills Eye Hospital, in 1892-'93.

For the privilege of reporting the following case, I am indebted to Dr. P. D. Keyser, of Philadelphia, one of the attending Surgeons to Wills Eye Hospital.

July 20, 1893, Mrs. P. age forty-three. History; rheumatic, otherwise negative.

Two years previous to admission a child ran its fingers in patients right eye causing great pain and dimness of vision. The pain soon disappeared, but for eight months eye remained injected and vision impaired. Both eyes then became intolerant of bright light, the right more injected and painful. For over a year the pain was periodic, coming on once a week. It always came on in the morning with sensation of foreign body in eye, gradually growing worse during the day, passing off at night as sleep came on. For past three months has had a paroyxsm every third day.

Treatment seemed to have no influence whatever.

When admitted to the Hospital by Dr. Keyser, there was present slight swelling of the lid, considerable conjunctivitis, haziness of the lower half of cornea with sensibility diminished and cilliary tenderness. Tension normal. V = not taken—too much pain.

Treatment.—Boric acid wash, iodiform; compress bandage; quinine internally.

July 31st, Pain has returned every third day since admission, though less severe. Salicylate of soda gr. X every three hours added to treatment.

Augsut 8th, No change, salicylates and quinine stopped. A bleb involving lower third of cornea, a separation of Bowman's membrane, which was incised and torn off.

August 18th, Pains continue. Bichloride of Mercury, gr. $\frac{1}{32}$ with Iodide of Potassium gr. V, ordered.

September 1st, Pains more severe,—large bleb excised.

September 2nd, No pain. Eserine gr. ¼ solution added to local treatment.

September 5th, Yesterday pain so severe almost unbearable patient imploring to have the eye removed. Free from pain today. After consultation the galvano cautery was lightly applied over whole denuded surface.

September 6th, No pain since operation, cornea more infiltrated, small ulcer down and out.

September 9th, Some pain but of different nature, probably from ulcer. Dry heat (Chinese stove) applied, and one drop of a 1% solution of hydrobromate of hyoscine instilled.

September 11th, Better after hyoscine used.

Septemher 13th, Pains returned to-day as severe as at any time. Examination showed large bleb which was torn off and galvano-cautery thoroughly applied to denuded surface.

September 16th, Much pain followed operation, relieved by leech and eserine.

September 20, No return of pain.

October 8th, Congestion nearly gone, cornea clearing.

October 18th, Eye quiet, lower third of cornea opaque $V = \frac{20}{200}$. w. $+ 2.75$ c. ax $90° = \frac{20}{70.}$ Discharged.

October 30th, No bad symptoms returned, opacity same.

January 25th, 1894, Patient returned to clinic to-day and Dr. Keyser kindly sends me the following note: Eye quite, cornea clearing. Has had no bad symptoms. What is peculiar, is a line of white infiltration in the cornea on a line with upper margin of the iris, which gives the appearance at first sight, of an anterior synechia. Vision for objects good.

As over four months have elapsed since operation, with no return of bad symptoms, it would seem a cure had been effected.

Dr. Frank Fisher has a less severe case in the Hospital which he treated in the same way with good result.

32 Adams Ave., West.

REPORT OF CATARACT OPERATION IN THE CASE OF THREE SISTERS.

By L. B. JELKS, M. D., Sherman, Texas.

Read before the North Texas Medical Association, June 21, 1894.

In making this report I do not claim anything original, either in the technique of the operation for cataract or in the after treatment.

I simply present the report as being of interest from the fact that THREE in the same family were afflicted with the same trouble.

The patients were colored girls, aged twenty-two, twenty-five and twenty-five (the last two being twins) and had been blind nine and thirteen years respectively, the twins having lost their sight about the same time.

Without attempting to arrive at a knowledge of the remote or exciting cause of the opacity, but content with knowing the immediate cause of their total blindness, and realizing that they had all to gain and nothing to lose, I at once advised an operation which was agreed to.

For the first operation I selected the youngest because her light projection was much better than the other two.

On July 19th, 1892, I operated on the left eye. After making the incision, and on introducing the cistotome to rupture the capsule the hyaloid membrane was ruptured, and there began an escape of virteous. I therefore closed the lid down without removing the lens. At the expiration of five days I opened the lids to find the eye in good condition, except slight inflammation, and, of course, still blind. The pain and inflammation had been so little that I determined to operate on the other eye at once.

Accordingly on the following day (July 25th) I operated on the right eye, with iridectomy removing the entire lens substance without any loss of vitreous. Five days later I opened the lids and found the wound healed nicely.

The eye made an uninterrupted recovery, and at the end of one month I fitted the patient a cataract lens.

The left eye has developed some vision by a partial solution of the lens which I failed to remove in the primary operation.

I did not give so favorable a prognosis for the other two, as their light projection was already poor, and I feared (even with a successful operation) a development of choridal mischief. Such was the result in one case, but the other has reasonably good vision.

In the case of the one who failed of vision I tested the light projection immediately before operation, and, as I have said, found it poor, but, determined to take chances on giving my patient the best possible vision, in preference to her total blindness. I made an extraction of the lens without any accident, and closed the lids to wait the usual five days for union and closure of the wound. The eye seemed to do as well as those of the other two patients. She seemed to experience no pain whatever. But, on opening the eye at the expiration of the usual time, I was surprised that my patient's vision was not improved. I vainly hoped that she would yet have some vision, when the inflammation should disappear, and the haziness of the cornea cleared up.

The eye had healed nicely and apparently there was no reason for the blindness. Upon artificial illumination, however, I found a pupillary membrane covering only about one third of the field. Thinking it useless to needle this small band of membrane, and still finding some light projection in the other eye, I proceeded, after waiting some time, to operate on the other eye, but with about the same result.

There is no improvement in the patient to-day, except two black pupils where, before the operation, there were two densely white and opaque lenses.

The two successful cases have, I think, as good vision, or, perhaps better than the average after extraction.

I was unable to accurately record their vision for, not knowing the letters they could not read our regulation test type.

TRICHIASIS AND KERITITIS: TREATMENT OF A PATIENT.

By S. B. Muncaster, M. D., Washington, D. C.

Miss R., twenty-two years old came to my office, February 20, 1892, complaining of severe pain in both eyes.

She gave the following history:—Father and mother died when she was about four years old; she had small-pox when very young; her eyes have given trouble since she was a small child; at the age of ten she had the lids operated on; and an iridectomy performed on the left eye in a hospital.

On examination I found a panus form of keritits: eye-balls very much redened, and opacities: lids separated 2 to 3 m. m. from inner canthus extending $\frac{2}{3}$ of the lids: eyelashes scattered along where the operations were performed: R. V.—$\frac{5}{21}$; L. V.—count fingures.

I removed the cilia, gave atropine and boracic solution; and recommended hot applications.

Treating her with ointment of mercury, zinc solution, &c. without much relief.

I used the electrolysis needle: she complained of so much pain I was obliged to discontinue.

I told her the only hope was to perform an operation on the lids to force the lashes out, and lengthen the upper lids, so that they might close and prevent the dust from accumulating on the corners while sleeping, and causing an irritation of it.

After performing several operations under ether she did not have any suffering for six months.

I thought she was almost entirely relieved, but alas! She came, after a spell of sickness, with her eyes red and complained of shooting pains.

I performed cantho-plastic operations on both eyes, and gave entire relief for more than six months, when she came looking much run down and stated that, "some time the pain was so severe that she could not stand it."

I gave atropine, advised hot applications, and maltine with hypophosphites.

At present the eyelids will close and the sight remains about the same as when she came to my office.

I have used, of late, papoid and boracic acid, equal parts, dusted in the right eye for the opacities.

"CATARACT EXTRACTION AN OFFICE OPERATION."

By ROBERT FIELDS LeMOND, A.M., M.D.,

Professor of Ophthalmology and Otology in Gross Medical College, Denver, Col.

I notice in the July number on page 7, a paper by Dr. S. Mitchell, of Hornellsville, New York, entitled "Cataract Extraction an Office Operation," in which he says, about one year ago he had a conversation with Dr. Lucien Howe, in which he said he thought the day not far distant when the ophthalmologist would consider cataract extraction a suitable and safe office operation.

Dr. Mitchell replied: "I did not concur with Dr. Howe then."

I must confess that I am surprised at this article and the conversation between these two gentlemen, whom I thought certainly kept pace with all the advances made in Ophthalmology, for this operatien has been practiced by some of our well-known ophthalmologists, for from two to five years as an office and dispensary operation.

I would like to call the gentlemen's attention to the transaction of the American Medical Association, section Ophthalmology, 1891, Washington, D. C., in which this, as an office operation, was advocated by Dr. T. E. Murrell, of Little Rock, Ark., now Professor of Ophthalmology in Barnes Medical College, St. Louis, in which he tabulated a number of cases operated upon, both in office and dispensary, and urged the profession to give it a trial as he had then practiced for two or three years without a single accident resulting therefrom.

I have read of, in the last three or four years, several cases reported by Dr. Murrell, in which splendid results were obtained, following cataract extraction, which were done either at office or dispensary. I have reported several cases myself of cataract extraction done at the Gross Medical College Clinic, in the last two years, and after doing the extraction I would allow the patient to get up, and in several instances, walk three or four blocks, and have obtained the very best results in all cases.

Dr. G. M. Black, of this city, has also been doing cataract extraction in his office for nearly two years and is a strong advocate of the operation being made an office operation. I have heard also that Dr. Michel, of St. Louis, and Dr. Cheatham, of Louisville, do these operations, both in office and dispensary, but as this is only heresay I do not vouch for the authenticity of it as I have never seen any cases reported by them in print.

In conclusion, I would say that I quit the old method of bandaging the eye after cataract extraction several years ago. After extracting the cataract, I wash the eye out thoroughly with the saturated solution of borac acid and then I seal the lids tightly together with isinglass plaster and unless there is a great inflamatory reaction and pain following the opertion, I do not break the seal until the fourth day and I leave off all bandages for the following reasons:

First. By leaving off the bandage we get rid of a great amount of heat, which is necessary to keep from the eye, that we may prevent inflammatory action and ciliary complication.

Second. I believe that the lids are the best covering for the eye, and when they are sealed they furnish all the support necessary.

Third. When the bandage is left off the function of lacrytion, which is so healing to the eye, is not interfered with.

I have practiced this method, until I can say in all safety that better results are obtained without the use of the bandage than with it. I say this in the face of strong opposition, for there are some who scorn such an idea, but we have sufficient proof when we have failed so far to regret using this method: to some it would be seeming negligence. I feel sure that the day is not far distant when cataract extraction will be universally recommended and practiced as an office operation.

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The Santa Fé Special.

When it was announced that the A. M. A. would meet in San Francisco, all the great trunk lines reaching this point, began to arrange for the transportation of the members from the East, South and Central States. There was naturally much good natured competition on the part of these lines for the patronage of all parties going.

After looking over the field, and looking into the various circulars sent to the members, we decided to cast our lot with the Santa Fé as it seemed from the measures they were using, they intended giving us a most delightful trip.

This being decided upon, we interested our friends in this route, and put ourselves in communication with their representatives, namely Mr. Ed. F. Sisson, of Chattanooga, and Mr. D. Wishart, of St. Louis.

Our party left Nashville May 28th, at 7:30 a. m., and arrived in St. Louis that evening, where we found all arrangements made for our safe and pleasant conduct.

The management at St. Louis, had waiting for us *special sleepers*, of the latest and most comfortable style which were to, and did, deliver us safely in San Francisco, notwithstanding the elements were at war, and many were detained along the way as a result thereof.

Across the undulating fields of Missouri, "rich in bounteous nature's golden harvest," over the plains of historic Kansas, where the dark green leaves of the growing corn waved us God speed to the Golden Gate, we sped. At Burnton, Kansas, we joined the *Association Special*, from Chicago, composed of four palace sleepers similar to our own, and also provided with special baggage.

From here to Hutchison, our supper station, was made at a flying rate of speed, for we had the right of way given.

At the above mentioned place, we were regaled by a bounteous repast served at one of the Santa Fé's noted R. R. hotels, which means much to those who have tried others.

We tarried not by the way, but on we went until Colorado Springs was reached, where we were entertained at the Antlers for breakfast. The rain came steadily down, but after a stop of a few hours here, we were conducted on to Denver, Mr. J. M. Connell, the Chicago representative of the road, having general supervision of the party. We saw Denver under difficulties, but then we saw it, and were pleased.

Returning to Colorado Springs, we found that our route over the Colorado Midland was cut off by washouts, due to the heavy rains, but then Mr. Connell busied himself with the wires, and as soon as arrangements could be perfected, the Santa Fé, nothing daunted by the derangement of its original plans as to route, notified the party that we would go by the Southern division. This statement at first was received with some regrets, but then these were soon dispelled when on the morning following our departure from Colorado Springs, we waked to gaze upon the snow-capped mountains and gorgeous skies. The weather now smiled and the change was so delightful as to cause us all to rejoice.

Through the ever changing scenes of New Mexico, and on over the higher altitudes of Arizona, with two powerful engines exhausting simultaneously, but still not exhausted, our train, a palace on wheels, rolled past The Needles into Southern California.

The day was typical of Southern California, and here we were refreshed by a bountiful repast, served according to the manner of the Santa Fé eating stations.

From here to San Francisco, was a long distance, but all arrangements were made for a speedy run, which was accomplished without a hitch.

Through the beautiful valley of the San Joaquin, rich in harvests of fruit, flowers and grain, and on whose gentler slopes and richer meadows browsed the sleek California cattle, and famous horses, we ran at lightning speed. The sensation was delightful, the scenes enchanting, as mirage after mirage rose, as if to bid us to stay, then faded from view.

In the evening of the eighth day, after some delays, but many pleasing experiences and recollections of our trip, we arrived at the City of the Golden Gate, glad to be there, but loth to leave our *Santa Fe Special.*

This road was the only one represented by a full Association Special, so far as we know.

It was the unanimous opinion of all composing our party, that the Santa Fé, had done its full duty to its patrons, and had afforded them every opportunity to see and be seen, for our train was admired by all who saw it, and envied by all who heard of it, while it will be long remembered by those who were fortunate enough to be on it, as one of the most pleasing parts of this unparalleled trip.

Thanking the representatives who treated us with so much consideration and kindness, we would say, that we will repeat the trip when opportunity affords.

"Latent Torsion of the Eyes."

In the June number of the *Ophthalmic Review*, Ernest E. Maddox, M. D., discusses the subject of "Latent Torsion of the Eyes." In this article he refers to the fact that the grosser errors coming under this head, are familiar, but says that "the physiology of torsion, apart from paralysis is not yet fully understood." This is in all probability true since the study of this condition has been confined to only a few who have given it special consideration for the last year or two.

Prof. Joseph Le Conte's experiments are not entirely satisfactory, since they are difficult of demonstration on those who have not devoted time to the question, and hence they are not likely to be resorted to, while the experiments of Maddox are susceptible of demonstration, and they are especially so when the condition of what he denominates torsion, exists in a marked degree.

Just here allow me to say that I have made the experiments as suggested by Maddox upon myself, but the results obtained were just the reverse of those he describes, since the condition of torsion in my case is the reverse of that in his own. I have the power of seeing a single line upon a card, held at the reading distance, doubled, whether the line be held horizontal or vertical, and in each position the superior obliques overacting cause the line seen by the right eye, to dip to the right while that in the left dips toward the left. I also made the test by a line at 6 m. distance, in this case using a prism base up or down to produce double vision. In this as in the previous experiments the lines dipped, in the right down to the right, and in the left down to the left.

I have also experimented with a Maddox Prism and Rod in combination, the prism behind and the rod in front, (the whole made for me by F. A. Hardy & Co., of Chicago, Ill.,) this little device being held in front of one eye and a simple Maddox rod in front of other, and always the middle line of light dipped to the side in which was seen the single line.

I think from this it will be agreed by Dr. Maddox that the condition present in my case, is not altogether a latent one, but fortunately it belongs to a class which is in the main, corrected by the effort at convergence.

The writer goes on to say: "Dr. Savage has shown that a certain amount of corrective torsion, or to substitute his own words, of 'harmonious symmetrical action of the obliques,' is necessary when oblique astigmatism exists in both eyes, since the retinal images of vertical objects are not themselves vertical, and that correcting cylinders which make these images vertical alter the torsional requirements.

"These facts may well have the practical bearings he claims for them. Of latent torsional anomalies sufficiently great to be called pathological, I have no experience, apart from definite paralysis of individual muscles, and therefore confine my remarks to the physiology of the subject."

It seems from the foregoing that Dr. Maddox, is open to conviction touching these important conditions, and we hope that Dr. Savage, who will present a paper before the Edinburg meeting upon this question, will be able to demonstrate to his satisfaction these yet unsettled points.

Our experience has taught us that these conditions are not only real, but of much importance in the successful management of those cases in which they appear. That they are pathological seems to be substantiated by the fact that when treated, symptoms of a most annoying character disappear, while the insufficiency grows less and less until it cannot be detected except by a strong proof test, if at all.

Geo. H. Price, M. D.

DEPARTMENT OF

Otology, Laryngology and Rhinology.

GEO. H. PRICE, M.D., EDITOR,
621½ Church Street, Nashville, Tenn.

DOUBLE ANTERIOR NOSE—TWO CARITLAGINOUS SEPTA AND THREE NARES.

By Dr. E. BAUMGARTEN.

Translated from the Rev. de Laryng, et Otal et de Rhinol, Jan. 1st, 1894, by Edward C. Ellett, M. D., Memphis, Tenn.

The following case, which was seen at the St. Stephanie's hospital for children, at Budapest, seems to be so far unique, for no one has yet described a malformation of this sort involving only the anterior portion of the nose, in a living child. Lefferts reports a double septum; Borelli describes a case of double nose, but the latter report is not clear from lack of details.

A. E., a strong, well grown female infant, eight weeks old, is the second child of healthy parents. Labor was normal, and the child has never been sick. The first child is healthy, and also the mother, whom I have seen, and who is a fine looking young woman. The child was born with the following deformity.

In the median line of the forehead, when the child cries, an elevation, the thickness of a pen holder, can be seen, which runs downwards as far as the root of the nose; the elevation is found on the upper lip, displaced laterally, and is hard to the touch. The skin over it is healthy and movable. The external nose is very large and flat, the bridge is large, unequal, lower on the right side than on the left. At the two lateral extremities of the bridge are found two projections, each corresponding to a tip of the nose, that on the left side being more prominent than that on the right. In front and below three noses may be seen, two normal ones below, to the left and right, and an irregular one above and in front. The two lateral openings are regular, of the same size, their integument being continuous with that of the upper lip. They are about 1 c. m. apart, that being the thickness of the septum at this point. Between the upper ends of these two openings and in the median line, is found the third regularly oval, with the long axis directed a little to the left. The distance between the central and the two lateral ones is 0.5. c. m. The circumference of the nose at the tip is 4 c. m.

In examining with the mirror, nothing abnormal is seen on either side. On both sides a sound can be passed to the pharynx. The septum is straight and normal on both sides. There is a little pus in the median naris; after removing it a rounded cavity is seen about the size of a bean, whose outer walls form the internal walls of the two septa. They do not unite at the center—toward the vomer—at an angle, but on a curved line above and below the sound does not penetrate much beyond the edge of the opening before it meets with firm resistance. Above and in front only, one feels a small area of bare bone, from which the pus seems to come. All of the cavity is visible. The mucous membrane is normal, and no opening can be found posteriorly, although the child breaths freely with closed mouth when the lateral noses are closed. If the lateral nares are alternately closed and the nose looked at from the side, there seem to be two noses, with a common interior.

This malformation should be regarded as an anomoly of development. The two blastodermic rudiments which form the cartilaginous portion of the septum are not united, while those of the vomer are. This malformation is closely analagous to double hare-lip.

When the child is older, the mucous membrane of the cavity can be denuded, and after the posterior attachments of the two cartilaginous septa are broken, uniting them with suture, will obliterate the cavity and cause the nose to assume a normal appearance.

THE

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CAUSES OF EYE-STRAIN.

By GEO. H. PRICE, M. D., Nashville, Tenn.

Read at the Meeting of the Tennessee State Medical Society, Memphis, Tenn., April, 1894.

The object of this paper is to call attention briefly to those conditions which are the most common causes of complaint, referred to the eyes of our patients. So soon as the function of the ciliary body, with its peculiar muscular arrangement, had been fully defined, one of the fundamental concepts in the study of asthenopia was made apparant, though its bearings were as yet but partially understood. Donders labored at length, and with much zeal, to solve this problem, and did so to his seeming satisfaction, yet subsequent developments have shown that he only partially stated the case.

He directed his energy and talent toward demonstrating that the "causa proxima" of asthenopia was to be found exclusively in this muscle of accommodation, and went so far as to deny the fact that the external ocular muscles had any part to play. Since the time of Donders, however, so much light has been thrown upon this subject that we are no longer in doubt on this point. If we were confined to this view of the question altogether, then there would be but few factors to consider; as hypermetropia, hypermetropic astigmatism, mixed astigmatism and a slight percentage of cases with myopic astigmatism would about cover the entire ground.

If we look into this matter we can formulate a rather extensive line of component elements, each a factor of importance, and more especially so when complicated by others. Beginning with the simplest and adding those which are to be recognized as complications, let us note the result.

Hypermetropia, or far-sight, pure and simple, which is rare, may be looked upon as the starting point of all this array. If to this we add astigmatism, which is present in the large majority of cases, that is, in about 65%, we then have conditions which call for relief, which relief is at hand in the proper correction of the defective focus of the eye. Could we eliminate from such a condition as the foregoing, all others, then the solution of the case and the relief of our patient would be simple, but unfortunately, we cannot do this in but few, hence we are compelled to look further for possible complications, and in many cases we find this in defective balance of the ocular mucles. I would not make the impression that all muscular anomalies are highly disturbing factors in hypermetropia when corrected, for there is one, which when associated with it, is looked upon as not so serious a complication, viz., esophoria or insufficiency of the external recti; whereas the opposite condition or exophoria, insufficiency of internal recti, is a positive disadvantage, a fact first demonstrated by Dr. Savage.

Again myopia, simple, also a very rare defect, in itself cannot be looked upon as a cause of much distress to the patient unless complicated by astigmatism or muscular insufficiency; and even then there are in this, as in the foregoing, certain forms of muscular insufficiency which with correcting lenses do not cause disturbance. We find that myopes, unless the defect is of high degree and complicated with astigmatism, complain but little, except of bad distant vision; but when the muscular defect is grafted on to this, then a train of symptoms develop demanding help at our hands for relief. From the foregoing it will be observed, as I have intimated, that defective focus is in many cases, the least important condition demanding our attention; but at the same time I am not to be understood as disposed to place these entirely in the back-ground, for in some instances they are the only cause of complaint.

After this very general survey of the question, let me point out those causes which we would consider as factors of eye-strain. For the sake of convenience, and in order to place them in some definite relation, I will begin with the least and ascend in the scale, according to the gravity of the symptoms which they, as a rule, present:

(1.) Myopia, uncomplicated.

(2.) Myopic Astigmatism, with the rule.

(3.) Myopic Astigmatism, against the rule.

(4.) Hypermetropia, uncomplicated.

(5.) Hypermetropic Astigmatism, with the rule.

(6.) Hypermetropic Astigmatism, against the rule.

(7.) Myopic Astigmatism, oblique.

(8.) Hypermetropic Astigmatism, oblique.

(9.) Myopia, any form combined with esophoria.

(10.) Hypermetropia, any form combined with exophoria.

(11.) Myopia, with esophoria and hyperphoria.

(12.) Hypermetropia, with exophoria and hyperphoria.

(13.) Myopia, esophoria, hyperphoria and cyclophoria.

(14.) Hypermetropia, exophoria, hyperphoria and cyclophoria.

(15.) Myopia combined with insufficiency of interni and externi, insufficiency of interni predominating.

(16.) Hypermetropia combined with same conditions, insufficiency of interni predominating.

(17.) Mixed Astigmatism, with muscular complications.

(18.) Muscular conditions alone.

This seeming formidable array of defects and complications when thoroughly mastered, give us an insight into most of the causes of eyestrain; but then the muscular conditions alone, referred to above, are often the only factors which demand our consideration.

I will not attempt at this time to enter into a lengthy discussion of each particular form, but rather take a few as types of the whole, and upon these base a few remarks, which I hope may prove of interest to those who are interested in the relief or suffering humanity.

Many are disposed to look with doubt upon the questions involved, but then I am satisfied, that when they have had the opportunity to observe the results, from the standpoint of those who give special attention to this subject, they will admit that there is at least a partial foundation for the faith that is in me, touching the efficacy of the treatment which we are now applying. It might be well, in order to be understood as to what eye-strain is, to briefly outline some of the more prominent symptoms which are met with.

A patient comes to you complaining of being annoyed by a sensation of something in his eyes, that is a gritty feeling, which soon causes his eyes to water and burn when he attempts any near work, such as reading or writing; or if a woman, she complains that her eyes thus trouble her when she sews. If they discontinue the near work, the symptoms subside to return again when they resume their work. This is the beginning.

If the work is compulsory, they soon show some conjunctival irritation with hypersecretion of tears and some mucus, which causes a blurring of vision. Later they complain of a tired feeling about the eyes, a running of the letters together, a constricted condition of the brow or head, a pain localized anywhere from the temple to the back of tha head, this sometimes extending down the back of the neck and about the shoulders, an inability to keep the eyes open or to read for any length of time without growing drowsy, photophobia, a twitching about the lids, later a blepharo-spasm, choreic condition of muscles of face and extending beyond, or most violent attacks of pain ordinarily called neuralgia, to say nothing of even graver disorders, such as epileptic seizures. This is but an outline which may be filled in by numerous symptoms characteristic of the individual patient. These symptoms manifest themselves from time to time, depending on the amount and character of work the individual is engaged in, the relief coming only when rest is given to the eyes.

With this picture before you, I am confident that many of you can recall patients suffering from some of these symptoms, in which all the ordinary remedies have been tried, but which afforded only temporary relief.

Now the question naturally arises: If the eyes are the seat of the trouble in these cases, is there any line of treatment applied to them which gives promise of permanent relief? I am glad, gentlemen, to answer yes, and if you will follow me a few minutes I will attempt to indicate the manner of dealing with some of them.

To begin with that form of defect which is rarest, and of least trouble, we will take up myopia. In cases of this type I will mention one: Mrs., H. age forty-eight, has had no special trouble with eyes except dim distant vision, which is found to be due to myopia, expressed in the following formula:

$$\text{O. D. V.} = \frac{20}{\text{XXX}} \text{ w.—1.25.}$$

$$\text{O. S. V.} = \frac{20}{\text{XXX}} \text{ w.—1.25.}$$

These lenses were prescribed to be worn all the time and patient is doing well.

Miss E. A., about twenty, has had considerable trouble with her eyes, both as to local and reflex symptoms. The local symptoms were blepharitis and conjunctival irritation, the reflex being headache, inability to read or do near work for any length of time, which had so far interfered as to prevent her from doing her ordinary work, such as sewing and reading, except with great discomfort. She had been fitted with glasses which gave her some relief yet not all she desired. She showed 5° of exophoria before the use of homatropine. After suspending her accommodation the following was found:

$$\text{O. D. V.} = \frac{20}{\text{XX}} \text{ w.—.50 cyl. ax. } 100^\circ.$$

$$\text{O. S. V.} = \frac{20}{\text{XX}} \text{ w.—.25 cyl. ax. } 180^\circ.$$

These lenses were given her for constant use, and at the same time she was put on exercise prisms to be used twice daily. She has improved rapidly and at last report was comfortable. In this case it will be noted that we are dealing with a condition of myopic astigmatism, which in itself is a cause of more disturbance than the simple myopia, and more especially when one of the cylinders is at 100°, and an additional complicating exophoria.

I will state at this point that when I refer to exercise prisms, I always refer to Exophoric set as devised by Savage and used upon the rhythmic plan as I now illustrate to you. [He showed the method already well-known to the readers of the Record.]

It will be obesrved from this case that the mere correction of the focal defect was not sufficient to give the patient comfort, and hence it was necessary to resort to that most important procedure, viz., the exercise of the internal recti. These being strengthened by the rhythmic contraction, incident to the use of the prisms, soon began to perform their normal functions thus bringing the desired result.

The next case I desire to bring to your notice is one of Compound Myopic Astigmatism complicated with exophoria, hyperphoria and cyclophoria.

This patient Miss C., complained of the ordinary symptoms which accompany eye-strain, and applied for relief. Under homatropine refraction showed up as follows:

O. D. V. = $\frac{20}{\text{XXX}}$ w.—2.25 $\bigcirc$ —.25 cyl. ax. 135°.

O. S. V. = $\frac{20}{\text{XXX}}$ w.—2.00 $\bigcirc$ —.25 cyl. ax. 75°.

1° exophoria, ½° hyperphoria R. Insufficiency superior obliques. As the exophoria is slight and the patient myopic, a full correction of the myopia was given, knowing that the exophoria in corrected myopia will cause but little discomfort, while for the cyclophoria, she was put on exercise for the purpose of building up the insufficient superior obliques. The result was that the patient experienced comfort, and reports are good.

The next case to which I will call attention is unique in some of its features, so much so in fact that it will be written up at length hereafter. This case is not only unique but it is one to which I would specially direct the attention of the gentlemen engaged in general practice, for there may be some one present who has a case similar to it in some of its features.

Mrs. E. C. W., forty-one years old, had complained of pain about the eyes, vertigo, headache, nausea, vomiting, tonic spasm of muscles of extremities, and intense photophobia upon any attempt at use of eyes. Nettlerash came on later as a complication of her miserable condition and obstinate constipation was added to the other long train of symptoms. Her condition grew worse despite all forms of medication, and the attacks grew so frequent and violent as to leave her prostrated after each attack. When the patient presented herself with the foregoing history, she was in anything but a good condition.

A preliminary test showed her hypermetropic, hyperphoric and cyclophoric, and slightly exophoric. These were sufficient grounds upon which to base a hope of doing something for her. Under homatropine her condition was found as follows:

O. D. V. = $\frac{20}{\text{XX}}$ w.+2.00. O. S. V. = $\frac{20}{\text{XX}}$ w.+2.00.

Hyperphoria O. D. 1½°, Insufficiency superior obliques, Exophoria 1°. I will here state that the muscular condition is always tetsed before the use of homatropine, as suspension of accommodation affects the action of the lateral muscles. It will be well to say here that the focal error alone would hardly cause such a train of local and reflex symptoms, but when taken in conjunction with the muscular condition, especially the Insufficiency of Superior Obliques and hyperphoria, both serious complications, it was a factor of importance. The patient was put upon exercise for her hyperphoria, and also given cylinders for the exercise of the obliques. The result has been most gratifying, as the reports showed the patient to have recovered almost, if not entirely, from her desperate condition.

Dr. A. F. W., medical student in our city, came complaining of inability to do his work on account of his eyes "giving down" in his reading. He said they burned, ran water and felt as though something was in them, and prolonged use caused his eyes to grow tired and head to hurt him. A perliminary test showed him hypermetropic and exophoric 4°. Under homatropine his focal error was as follows:

O. D. V.-= $\frac{20}{\text{XX}}$ w.- 1.00 $\bigcirc$ +.50 cyl. ax. 70°.

O. S. V.— $\frac{20}{\text{XX}}$ w.+1.00 $\bigcirc$ + 1.00 cyl. ax. 10°.

On account of his exophoria the spherical part of his lenses was left off and he was given only a +.50 cyl. ax. 70 for his right, and +1.00 cyl. ax. 10° for his left eye, and also put on the exercise for his insufficient internal recti muscles. The result was such as desired, and he gradually returned to his full work.

It will be noted in this case that we gave him no spheres but only the cylinders, this was done since we wanted him to have the full benefit of the action of the internal recti which are always stimulated in accommodation. I cannot go into all the details of these cases as it would require too much time.

Judge W. A. is a patient whose case is specially interesting since it presents the same character of focal error as the foregoing, but much less in degree, while the muscular condition is quite different.

This patient showed under homatropine the following:

O. D. V. $\frac{20}{XX}$ w. +.25⊂+.25 cyl. ax. 10°.

O. S. V.= $\frac{20}{XX}$ w.+.25⊂+.25 cyl. ax. 5°.

Insufficiency superior obliques. This patient had been compelled to abandon the position of Supreme Judge in a distant state and to give up a lucrative law practice on account of a failure of his eyes to stand the work incident to his profession.

He is presbyopic and had used glasses purchased at random for reading. With the history and the condition of focal and muscular defects above, we gave him the correction of his condition, and at the same time put him on exercise cylinders to strengthen his superior obliques. His condition has improved since the first few days' use of glasses and the exercise cylinders. and he is now able to do a moderate amount of work with increasing comfort. The focal defect in this case was but slight and but for the complicating condition of Cyclophoria he would have experienced but little trouble in all probility. While many patients improve rapidly from the first few days or weeks, when put on this treatment, yet it requires considerable time to complete the cure. Then too, now and then they have exacerbations of trouble, which disturb them ; but patience is required to effect what we are striving for.

There is another type to which I will call your attention. though it is not so common, viz., insufficiency of both the internal and external recti muscles with insufficiency of one of each pair predominating. In such cases, the patient may show exophoria and this may lead the examiner to conclude that this is alone responsible for the trouble, but if he will test the muscles individually he will find that both the internal and external recti are faulty. In such a case we find, for example, the internal recti able to overcome a prism of only 15° base out, where they should be able to overcome two or three times that amount. Again we find that the external recti overcome only about 4° to 5° where they should overcome 8° to 10°. In such a case it is necessary to exercise both pairs of muscles, and this can be done by the set of prisms I have recently devised, and now bring to notice for the first time.

This device is a combination of two prisms in each cell of the frame, resembling in construction the ordinary Franklin bifocal lenses, but of course being quite different in their action. As we wish to exercise both the internal and external recti muscles in such cases, we have the bases of the prisms in each cell of the frame placed in opposite directions. Again, as the internal recti are capable of more work than the external we use a 2° prism base out in each lower half of the cell, to call the internal recti into action, while for the exercise of the external we use a 1° prism base in, in each upper half of the cell. As to the use of this form of exercise it can be briefly stated thus:

Have a lighted candle, lamp or gas-jet, fifteen or twenty feet away, say on opposite side of the room, then a card on which is a well defined black or red dot to be held in the hand of patient. Now, with the prisms on as an ordinary pair of Franklin divided lenses, the patient looks at the dot on the card (the card being held at the ordinary reading distance), through the lower prisms, which causes increased action or exercise of the interni; then simply raising the eyes and looking at the light in the distance through the upper part you call into action the externi.

Repeating this simple process you call into action, that is exercise, both pairs of muscles at one sitting, without discomfort to the patient. This exercise should be practiced night and morning, and for about ten minutes each time. If the patient should experience any discomfort before the ten minutes has expired then the exercise should stop. It should always be the last thing before retiring so the eyes can have complete rest afterward, and just before breakfast in the morning, as the rest during the morning meal, and time elapsing before work of the day is begun, is necessary, as work immediately after exercise is apt to induce trouble.

All of the forms of exercise to which I have called your attention are now and then employed where no lenses are given to correct a focal defect, and are just as important where muscular insufficiency exists without focal error, as they are when such errors exist.

CONJUNCTIVAL POLYPS AND THEIR RELATION TO MALIGNANCY; WITH A CASE.

By M F WEYMANN, M D , St Joseph, Mo

In July, 1893, the wife of a farmer came to consult me about some trouble in her right eye. She was about forty-five years of age, of American parentage, and apparently perfectly healthy. Her record was faultless, both with reference to tubercular trouble or malignant growths, and also her parents were perfectly healthy; nor was there any history of eye affections in her family. Her own trouble was—according to her ideas—the result of a trauma, a drop of boiling lard having jumped into her right eye, where now there could be seen a small white speck. The injury was followed by some inflammatory reaction which, however, soon subsided without medical aid. Several months later she noticed a small white speck, which gradually began to extend to its present dimensions—about 1½ mm. thick, 4 mm. wide, and 5-6 mm. long. It was situated on the eye-ball, one-fourth of it being located on the cornea, while the rest extended from that structure toward the outer canthus, about in a line with the fissura palpebralis, which also represented its longest diameter. The growth was bacon-white in color, very hard to the feel, and rough on the free surface. Examination with a magnifying lens revealed numerous small projections, giving the tumor a cocks-comb appearance. The tumor substance was really nothing but a greatly altered and hypertrophied conjunctiva, because it was in direct continuation with the adjacent parts, the border being well-marked and sharp cut. It was also freely movable on the globe, except the corneal portion, which was firmly attached.

The tumor had at first given little annoyance, but as it grew the eye became sensitive to light. There was also a great deal of lachrymation and inflammatory reaction. The conjunctiva was very hyperæmic, and in some places chemotic, while the lining of the lids showed a great deal of soreness and roughness. Complete closure of the lids being impossible, there also collected much dust in the eyes, which only increased the mechanical irritation of the neoplasm.

My diagnosis was "papilloma conjunctivæ corneæque."

I advised removal of the tumor, which was accepted. Bounding the conjunctival portion by scissors, I then removed all loose connective tissue on the ball and cut the corneal part off with a cataract knife. The defect was covered by slipping, except on the cornea. Healing was prompt and the patient dismissed on the fifth day.

Histological examination showed the diagnosis to have been correct. The conjunctiva showed an enormous hypertrophy of the papillary body with a corresponding degree of thickening of the epithelium. The corneous layer especially was enlarged to an extraordinary degree, and showed loose scales all over the sections. There was one peculiar thing about it, namely, a great number of epithelial spheroids or nests, which strongly pointed toward malignancy, and made the tumor an "epitheliomatous" papilloma.

The patient returned about a month later. The wound had nicely healed up and the symptoms of irritation were almost all gone. However, there were noticable a few whitish specks of tissue on the former corneal seat of the growth. They proved to be loose and necrotic flaps of corneal epithelium, which I removed. As a measure of precaution, I cauterized the part thoroughly with Ag NO 3. I then gave the patient instructions to return in case of trouble, pointing out to her that it might become something serious. Up to within a few months I have had occasion to hear from the patient, but no recurrence has so far shown itself.

The case reported here I consider somewhat rare. it being the first one observed by me in my practice. Of the typical form of conjunctival papillomata I have so far met three, two of which were seated on the lower lid, near the punctum, of which variety I also had the good fortune of seeing several cases while studying under Prof. DeWecker, of Paris.

The last one I excised was very small, and grew from the caruncle. Its removal became nècessary on account of the mechanical irritation it caused, and on account of interfering with the closing of the lids.

With reference to the case reported in full, I have made a careful comparative study of other similar cases on record, which has led me to the formulation of the following statements:

1. Papillomata may affect any part of conjunctiva reasonably free, not excepting the cornea.

REMARK: Sattler (*Ophthalmic Review* 1892) reports a very large papilloma principally invading the cornea. He seems to find an obstacle in the genesis of the tumor, so far as its genesis is concerned, because the cornea is devoid of papillæ. It must be remembered, however, that the two anterior corneal layers are merely modified conjunctiva and that invasion of the cornea from the conjunctiva would not go against our understanding of neoplastic extension. His conclusion that the latter must have occurred is entirely rational and correct.

2. Conjunctival papillomata appear under two principal forms, the typical or polypous, and the atypical or flat.

3. The typical form usually grows from some free point of conjunctiva, most often from the lid margin near the lower punctum or from the caruncle.

4. The atypical or flat form occurs most frequently on the globe of the eye, especially near the corneal junction, with a tendency to invade the cornea.

5. The polypous form is practically always benign, although it is very prone to return unless the pedicle is cauterized and excision thorough.

6. The flat form may be benign, but also may undergo malignant degeneration.

7. Conjunctival epitheliomata frequently simulate papillomata in their initial stage.

8. The color of the polypous form is always red or pinkish, the flat may change from red to brown, may be gray or even distinctly white.

The polypous form may differ in size from the head of a pin to a hazlenut, but in form is always pear-shaped, unless changed by pressure. It is always implanted by means of a pedicle.

SCOPOLAMINE HYDROBROMATE.

By ARTHUR G. HOBBS, M.D., Atlanta, Ga

This new mydriatic is being tested now by some oculists, especially those who are in charge of large clinics where it can be conveniently alternated with atropia, homatropia, etc., and the results compared. It seems at present to occupy a middle ground between atropia on the one hand, which is known to produce a complete paralysis of the accommodation and retain its effects for a week or ten days, and homatropia which is claimed by some, and denied by others, to effect a complete control of the accommodative muscle and retain its effects only twenty-four hours. In the first case the time necessary to accomplish a full paralysis ranges from three to four days; and in the second, only sixty to ninety minutes according to its advocates.

Scopolamine requires about two hours, with intervals of twenty minutes between the instillations according to my observations, to bring about the desired result, and so far as I have been able to decide by comparative tests, the full effect is then reached quite as completely as that produced by a three day's use of atropia. Its paralysis lasts from two to three days, so it occupies a place between these two leading mydriatics, both in the time of reaching its maximum effect and in the time of its complete decline. The above comparison is based upon the assumption of the advocates of homatropia that this drug produces a complete relaxation of the accommodative muscles in one to one and a half hours, the truth of which I am not yet fully prepared to accept. In the same proportion that atropia is used, in a one-half to a one per cent. solution (approximately

2 to 5 grs. to the ounce) and homatropia in a one per cent. solution (about 2 to 5 grs. to the ounce), so scopolamine is used, as a rule in solution of 2 to 5 grs. to the ounce, although I prefer it in weaker solutions. It should be dropped into the eye at intervals of twenty minutes until four instillations have been made, when it may be assumed that complete paralysis of the accommodative muscles has been reached.

It has served me thus far, in such refractive tests that have required complete paralysis of the accommodation, quite as well as atropia, and while it does its work much more quickly, its decline is, at most, only about $\frac{1}{5}$, and oftener $\frac{1}{6}$ of the time required when atropia has been used. Homatropia will be the ideal mydriatic, however, when we can become convinced that it effects a complete paralysis of the accommodation in one hour, or even in twice that time, since there can be no question of its more rapid decline. Scopolamine produces no unpleasant effects in the throat and it allows a possible accommodation within a day and a half or two days, after its instillation, although the pupil may not become normal for a day or two longer.

Great comfort may be extended to the patient, particularly if he should be a business man with few hours to lose from his work, by prescribing a weak solution of eserine ($\frac{1}{8}$ grain to the ounce), in order to more rapidly reduce the size of the pupil and indirectly aid the restoration of accommodation.

Some have asserted that scopolamine does not increase intraocculor tention, but its use has not yet been sufficiently extensive to fully warrant this statement. Should this be true, scopolamine would possess a great advantage over atropia, especially in older subjects. In some phlyctenular forms of keratitis as well as in iritis, when occurring beyond middle age, it seems particularly efficacious; indeed I have already learned to place much more confidence in it and feel safer when using it in such cases. Although it is much less expensive now than when I first began its use, about two years ago, its cost still restricts its general use.

We may hope that the consensus of opinion will, in a year or two, furnish us with a more accurate knowledge of this drug, to indicate to us when and in what cases it is preferable to atropia, or homatropia, in case it should ever reach this point of usefulness.

It is my opinion that it will in many cases supercede the first, and entirely supplant the last, unless homatropia should prove itself equal to the occasion now claimed for it by many. In this latter case homatropia will supersede both atropia and scopolamine for refraction work, and leave a very narrow field of usefulness for the latter. Since the contingency still exists, however, we may continue to use scopolamine, particularly where we fear atropia, as well as in refraction work.

MEASURING THE PUPILLARY CENTRES AND CENTERING LENSES.

By B. ALEX RANDALL, M.A., M.D., Philadelphia.
Ophthalmic and Aural Surgeon to the Children's Hospital, etc.

It has always seemed to me that too much circumstance was made of the *methods* of determining these important matters, with the result that many have been deterred from proper attention to them because they lacked the elaborate instruments which some have thought needful for the measurement, or have been befogged by the intricacy of the method employed and failed to detect rather palpable errors. The only requisite is a simple ruler, a few inches or centimeters in length, plainly and accurately graduated. This should be held across the face, resting on the bridge of the nose and with its edge as near as possible to the eyes. The mensuration is best made by standing so that a distant light—window or flame—falls over the scale on the examined eyes and forms bright reflections from the cornea, the separation of which is easily measured. The examiner, at arm's length distance, brings the zero-end of the scale in line with his right eye and the right side of the left corneal reflection, then closes the right eye and with the left notes the mark on the scale in line with the corresponding point of the patient's right eye—thus reading off to a fraction of a millimeter the separation of the poles of the cornea. Or the pupillary edge may be taken as the point for measurement; or in case of strabismus, the distance from the outer canthus of one side to the inner canthus of the other. The scale is held so near the eyes that there is room for little parallax, and that little sinks to the vanishing point when the examiner's interpupillary distance forms the equivalent of the outer part of Landolt's parallel ruler.

This distance accurately measured, the centering of the lenses easily follows. If insufficient convergence calls for prismatic effect by decentering, we know that each centimeter of displacement of each diopter of lens gives a degree, centrad or "prism-diopter" of effect. Thus + 1.5 s. ≍ + .75 c. axis 90° decentered inward 0.5 cm. gives 1.5 + .75 = 2.25 x .5 = 1.12 degrees or centrads, basein. In the same way—3 s. ≍ — 1.5 c. 180° decentered 6 mm. out would give no effect from the cylinder in the line of its horizontal axis, but only .3 x .6 = 1.8 degrees or centrads, basein. This was made so clear by Prentiss in his plea for the "prism-diopter" that no one should need to be reminded of it, unless he has lost sight of the practical identity of the three prism-units in the lower numbers.

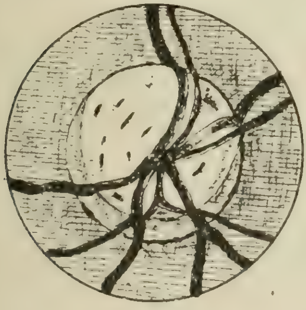
It only remains, then, to apply this simple rule to the conditions presented by the needs, the lenses and the interpupillary distances for far and near of the patient in hand; and these problems are *mechanically* solved. That Ophthalmology is not a branch of mechanics, nor the eye a mere optical instrument to be successfully dealt with by physical laws, without consideration of physiology, does not at all weaken the force of such laws, but shows that the ophthalmologist must be more than an optician.

A CASE OF UNUSUALLY EXTENSIVE CONGENITAL EXCAVATION OF THE OPTIC NERVE.

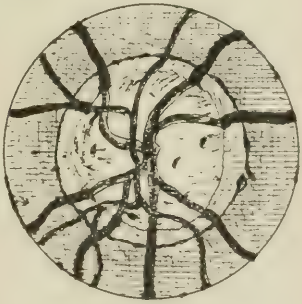
By E. C. ELLETT, M D., Memphis.

In Loving's Text Book of Ophthalmoscopy, Vol. 1, p. 61, is figured the optic disc of a healthy adult female, showing an unusually large congenital (physiological?) excavation. The same condition was present in both eyes, and in the eyes of the patient's daughter. The vision and visual field were normal. I know of no similar recorded case, nor had I until recently seen such a one. A few weeks ago I found this appearance in both eyes of an adult male, and deem it worth reporting.

W. C. M., age fifty-four, male, complains of presbyopia for ten years. He has never had any pain in the eyes, simply failing near vision. On examining with the ophthalmoscope the following condition was found:



O. D.



O. S.

O. D. Media clear. The disc is of about normal size, and irregularly round. The striking feature is an extensive cupping of the disc. This extends above to the chorioidal ring, which is pronounced, but laterally and below it is separated from the ring by a band of normal nerve substance. Kneeing of the vessels is tolerably well marked, particularly above. No pulsation of veins or arteries. The eye ground is otherwise normal. General refraction + 2.00 D. Bottom of excavation—1.00 D.

O. S. Practically the same condition is found in this eye. The ring of nerve tissue is continuous all around, and except for a break at the temporal side, the chorioidal ring is also continuous. The refraction of general funders and bottom of excavation is the same as in the other eye. The functional examination shows: O. D. $\frac{20}{70}$ + s 1.75 = $\frac{20}{20}$ with + s 4.00 reads J.i; as $\frac{20}{70}$ + s 1.75 = $\frac{20}{20}$ p. with + s 4.00 reads J.i. There is no limitation of the visual field for form or color. No scotomata; no hypertonus. I therefore conclude the case comes under the head of non-pathological excavations.

"CATARACT EXTRACTION AN OFFICE OPERATION."

Burlington, Iowa, August 11, 1894.

To the Editor: I desire to enter a protest against the advocacy, under the above title, in the last number of the Record, of a method which its promoters will not deny embodies more risks than the old fashioned one of operating at the place where the patient expects to remain for convalescence.

I may misapprehend the gravity of the situation, but my idea has always been that it was the duty of the operator not only to make the best operation possible, but also to avoid everything possible in way of risk or obstacle to a successful result.

I have no doubt that dozens of office extractions have been perfectly successful, and that dozens will be. But one failure from any cause which would have been prevented by operating at home or in a hospital, must forever dim the lustre of any reputation gained by dozens of successful office extractions. Let us hope that the day is far distant when the teaching will prevail that, save in exceptional emergency, is "cataract extraction an office operation." Truly yours,

H. B. Young.

CATARACT EXTRACTION NOT YET AN OFFICE OPERATION.

By LUCIEN HOWE, M.D., Buffalo, New York.

The July number of this journal contained an article by Dr. S. Mitchell, entitled "Cataract Extraction an Office Operation." He began this by saying, "About a year ago, during a conversation with Dr. Lucien Howe, relative to the care of patients after cataract extraction, he remarked that he thought the day not far distant when the ophthalmologist would consider cataract extraction a suitable and safe office operation." "At that time," he continued, "I did not concur in this opinion . . . . but in the light of a recent experience, I have changed my mind somewhat in this regard." I remember saying substantially this at the time of Dr. Mitchell's call upon me, and it was not to be wondered at that an opinion decidedly at variance with that which is now held in certain parts of the country should have been read with some surprise. But in the last number of the Ophthalmic Record, three articles, each entitled "Cataract Extraction an Office Operation," not only show surprise, but also indicate that scathing criticism is the only proper rebuke for any one presumably so ignorant of what has been done, or so mistaken as to prophesy what was considered by the writers a fact already well established. One of them informs us that nine years ago he published an article on the subject reporting a considerable number of cases operated on in his office, and at the college clinic; another that he wrote on the subject two years ago, and that "time and again he has published articles in the journals, and read papers before the medical societies on the subject; while the third, who is also making cataract extraction an office operation, is "surprised at the conversation between these two gentlemen, whom I thought certainly kept pace with all the advances made in Ophthalmology, for this operation has been practiced by some of our well-known ophthalmologists for from two to five years. as an office and dispensary operation."

Ordinarily this form of discussing a scientific question is unprofitable if not undignified; but in the present instance it occurred to me that silence on my part would be misinterpreted, and also that a brief and unprejudiced statement of the reasons for any such opinion as mine would express not alone the result of my experience, but also, I think, that of the vast majority of practitioners who, like myself, are not accustomed to consider cataract extraction as a suitable and safe office operation, though they also look forward to the time, perhaps in the near future, when it may be so.

In regard to this we should remember that the idea is by no means as new, nor as original in this country, as the writers in the last number of this journal would lead us to infer.

In 1873, when in Italy, my attention was called to an article written in 1870 on the subject by Fenoglio,* who, as far as I know, was one of the first to allow patients to leave the clinic immediately, or within a few hours after this operation. As an experiment it was well tried there, and was at least well known elsewhere—but the ultimate verdict was against it.

Probably an exact examination of the literature would show more than one writer recommending the procedure, or giving numerous instances in which their ignorance or wilfulness necessitated the treatment of patients as out-door cases, but where, in spite of that, the results were good. For example, I remember well the case of a patient upon whom I operated at the Buffalo General Hospital in the days when chloroform was used, and who, that night, developed a form of acute mania. The next morning she jumped out of a window, and, landing on her feet, ran nearly a mile before the pursuing nurse was able to bring her back. That day she and her friends insisted upon her being taken to her home by train. But in spite of it the result was excellent. I hardly think, however, any one would recommend such gymnastic performances as a safe and suitable portion of the after treatment for cataract extraction.

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*Fenoglio. Sugli ultimi metodi di estrazione lineare della cataratta. Padova, 1870.

The second observation that I wish to make is, that I not only knew of attempts made of this kind, but moreover, like many others probably, have also made the extraction of cataract as an office operation in a few instances, when the circumstances seemed to warrant it.

No. 1. November 6th, 1890. Mrs. W. B. V. Operation before the class at the Medical Department of the University of Buffalo. Immediately after the patient could distinguish time by watch: light bandage applied, and she rode between five and six squares to her house. Slight iritis. Last test was made on the 24th of May following. At that time, she had vision of twenty-fiftieths.

No. 2. Mrs. M. A. Same operation, same time and same place. Patient rode four squares from the college to her house. Considerable iritis followed and deposit formed in pupil, but after discission patient obtained vision twenty-seventieths.

*No. 3. C. G. May 25th, 1890. Extraction with iridectomy. Patient walked four squares to his house. On the thirty-first of May, vision twenty-fiftieths. Deposit afterwards formed in pupil, and present vision twenty-two hundredths.

A careful examination of the records would undoubtedly show other such cases where extraction was made at the office, or at the Buffalo Eye and Ear Infirmary, but the three already cited are sufficient to illustrate the point which I wish to make. I do not think a good operator allows the wishes, or even entreaties, of the patient to swerve him from a course which seems best to his judgment, but, undoubtedly, my opinion then was

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*These patients are still living, and the writer would be happy to give the exact addresses to any one sufficiently interested to enquire further concerning the details.

somewhat influenced by the tabulated cases which Dr. Cheatham had contributed to the Archives of Ophthalmology. These cases were trials of a method warranted by the circumstances, but frequent repetition was not deemed justifiable, either from theoretical considerations, or because of the results obtained. I cannot but think now that better results probably would have been gained by other treatment; and in a matter of such enormous importance we should be satisfied, not simply with good results, but only with the very best obtainable under the circumstances.

In reality, the question is not simply one of having the patient travel to and from the office of the operator. In the majority of cases, the choice is between a hospital with attendants more or less trained, and such unskilful, meddlesome nursing as is too often obtained at home. Even the small cities now contain hospitals where such cases can be properly provided for; and if unnecessary risks are imposed upon the patient when so precious a thing as vision is at stake, it is not surprising if most patients would be apt, from their standpoint, to look at the matter very much as did the surgeon referred to by one of the writers in the last journal, who said that to take such risks in his part of the country would mean a suit for damages. It makes a difference whether one is at the surgeon's or the patient's end of the knife.

A long paper might be written on the great advantages of hospital treatment of cataract, but in the present communication it is possible to refer briefly only to a few. In regard to the operation itself, the appliances and apparatus to be found at a hospital are usually better than those in the average office.

If the patient is allowed to go to his home, he must brave the elements, whether favorable or unfavorable to him at that time; and while all of us believe in fresh air and plenty of it, there is no advantage in a drenching rain, or in the liability of pressure upon the operated eye, which might come when one is feeling his way through uneven, or perhaps slippery streets, or amid the difficulties of a storm. As to the care of the eyes after the patient arrives at home, if we could be sure that the lid pressed evenly and naturally upon the globe, and that nothing in turn would press upon the lid, the patient would be quite as safe, it must be admitted, in sitting in his own room as in a hospital ward. In practice, however, we know how great is the temptation to kind and meddlesome friends "just to fix the bandage a little," and in doing so to press upon the lids, thus opening the wound; or to wipe the lids with a soiled handkerchief, or to make applications which they may think are perfectly safe, but which are often the essence of harmful abominations. In addition to intentional meddling with the eye, there is always the chance of the patient, when at home, making some pressure upon it against which he would probably be guarded if under the care of a trained nurse. It is true that with the recent advances in methods of dressing the eye the prospects of such accidents are growing beautifully less. At present most operators consider the natural covering of the lids to be the best means of coaptating the wound, carefully avoiding any pressure on the lids, such as easily occurs from much cotton or from tight roller bandages. If the eye is thus lightly closed with adhesive strips or otherwise, and the whole region protected with a shield of some sort, which allows free ventilation, the chances for injury are reduced to the minimum. Such a wire shield I described as long ago as 1885, and in a modified form it is used largely in New York hospitals still. Within two years, however, Ring of New York, has suggested a mask which is preferable to the wire shield. This mask, as he first described it, had the disadvantage of not allowing free circulation of air beneath it; but if made with a sufficient number of perforations, it protects the lids from meddlesome hands, or from accidental pressure, practically freeing the patient from danger in that respect. With other such apparently small, but really important advances as these, cataract extraction may, in the near future, become a suitable and safe office operation.

Those who argue from three or four cases, or even from a few dozen, that such a method of treatment is as good as the other, do this, I think, from insufficient data, even though the results obtained may be fairly good. The question is not, will such wounds heal under disadvantageous circumstances. We all know that they will. But it is very doubtful whether the healing is as complete and uncomplicated as it would have been under more favorable circumstances. Most think it is not. Of course that is only a matter of opinion. But on the one hand, we find the vast number of operators in this country and in Europe, who have under their supervision not tens, or hundreds of patients, but rather thousands in the aggregate, practically without exception, favor the indoor care of cataract patients. On the other hand, we find one practitioner who reports fifty-five cases in less than ten years, and perhaps half a dozen other operators reporting similar results. In this instance, I must be weak enough to be counted with the majority.

It would seem also that even Dr. Cheatham, who has apparently the largest experience in this respect, is not as strong an advocate of the method in practice as one might suppose from his last article. He says that in 1885 he had operated on twenty-four cases, and now in 1894 the number has increased to fifty-three, with two others which might be included. In other words, during the last nine years he has made only twenty-nine operations by this method, or, on the average, less than four a year. He can hardly mean, therefore, what he says later, that "all cases cannot be operated upon at an office, but a majority can." From his figures, we can only infer that like the rest of us, he really agrees with the title of this paper that catraact extraction is not yet an office operation.

It is possible that still other article's like those in the last issue, may appear, and to some of these a reply might be made, but until new facts or arguments are presented it is better that this conclude my share in the discussion.

"CATARACT EXTRACTION AN OFFICE OPERATION."

By S. MITCHELL, M.D., Hornellsville, N. Y.

At the mouth, or rather by the pen, of three witnesses, the fact seems to have been pretty well established, in the August number of the RECORD, that Cataract Extraction had been performed as an office operation a long, long time before I performed my first operation as such; in fact, a long time before I had ever performed a single operation upon the eye.

When I wrote my paper I was aware of the fact that a few ophthalmologists were operating for cataract in their offices, and was also aware of the fact that only a few deemed it a safe procedure.

Since I began operating, a little over five years ago, I have felt that there was altogether too much restraint placed upon patients after operations upon the eye. So I began very soon to allow my patients more freedom than I had been taught to do by those with whom I had been instructed.

After performing twenty-five or thirty extractions, I began allowing patients to remain out of bed after the operation, and to be about the house with the unoperated eye open, after the second or third day. My results have been fully as good since this relaxation as they were before.

Since writing the paper that appeared in the August RECORD, I have performed three extractions in my office, one patient riding a half mile in a carriage after the operation. The recoveries in these three cases have been as uneventful, and results as good, as those operated upon at their homes.

Dr. Howe has written me that he intends to publish a paper on the subject in question, and cataract extraction as an office operation is likely to receive the consideration that it deserves.

LEAVE THE EYE NOT OPERATED UPON UNCOVERED, AFTER CATARACT EXTRACTIONS.*

By JULIAN J. CHISOLM, M D., LL.D., of Baltimore, U. S. A.

In the short paper which I offer, I desire to give my personal experience, now quite extensive, in a positive departure from the standard method of dressing and treating eyes after cataract extraction. In my earlier life I was taught that, for the first ten days after operation, the eyes could not be kept too quiet, and that even the suggestion of movement in them should be avoided. This is the belief of most eye surgeons to-day, and their practice is moulded upon it. Both eyes must be kept closed for at least one week, and then slowly admitted to the full light of day. In bed is considered the best place for such blind-folded patients, for when on their backs and in the dark, they are supposed to be out of danger. Most surgeons accept the so-called fact, that the movements of the eye-ball will interfere with the healing of a corneal wound; that if the eye be permitted to move, the wound cannot be kept from gaping, and therefore, proper union can not take place. As we know that the movements of one eye must affect the other, both must be bandaged and kept quiet. Now my experience during the past six years, in at least 600 cataract extractions, has shown me that the theory, however, universally accepted, is not followed by the results stated. The movements of the eye-ball do not disturb, in any way, the rapid healing of the corneal wound, and therefore, do not tend to iritic protrusion after simple cataract extractions. Once the fact is established, and in my experience it is absolutely so, I can allow patients the inestimable comfort of having the eye not operated upon, left open during the whole treatment. This decided departure from the usually adopted methods, robs the cataract operation of all of its terrors because it is the blind-folding for ten days in dark rooms, that is most alarming to the majority of old people. I can now say with confidence to my patients, that under cocaine drops, the operation is free from pain; that with steralized instruments there is but little danger of destructive inflammation, and that with one eye opened they can safely continue to enjoy all the useful sight that they are accustomed to be guided by. I need not draw a picture of what all of this means; you can yourselves add the words, and you can not make them too strong, to cover the mental and bodily comfort which such patients enjoy.

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*Read in the Section of Ophthalmology, British Medical Association, at Bristol, Eng., 1894.

For twenty-five years your present method of closing both eyes in dark rooms, was also my method, in at least 1,000 extractions. I vied with the most careful, how this passive condition of my patients could be best insured. Each of us, for good reasons, which we all recognize, desire to secure the very best per centage of results. Cataract operations are among the most common in eye surgery and the restoration to good sight is considered by the public the most wonderful of all operations in the whole domain of surgery. The interchange of experiences among eye patients is proverbial and universal. Patients who see the best, and have been the least annoyed by the treatment extol their surgeons, and consequently obtain for him a larger following. On this account, we are all striving to secure the best results, and increased percentage of cures, so that our clientele may not suffer by comparison with the best work of the most skillful. After six years experience, with at least 100 extractions per year, my results compare very favorably with those that are on record. With every wish to be among the very first, I am constantly studying how to secure the very largest percentage of cures. I now find that it cannot be increased by going back to the so-called conservative method of closing both eyes.

Using every precaution, with asepsis, whether the extraction be made with or without iridectomy, I close the eye operated upon only, and with a bandage that makes no pressure. I believe that the tonic contraction of the palpebral muscle, with its contiguous curved splint of tarsal cartilage, is all that the corneal wound needs for perfect adaptation and support. To keep this eye closed in the natural condition is all that should be wished for. This I do by covering it with a bit of thin muslin wetted, and therefore, made more pliant by a sublimate solution. This in turn is covered by a thin layer of elastic cotton wool, kept in place by a light bandage, a piece of cloth four by three inches, to the four corners of which tapes, to go around the head, are attached. Formerly I secured the closed lids by a single strip of isinglass plaster. For the past three years I have discarded this good dressing, because I desire to inspect the eye daily, and find the renewal and the reapplication of the sticking plaster troublesome. As a rule, I liberate the eye operated upon on the completion of the fifth day. For my hospital wards, I only shut out sunlight. If the patient has still useful vision in the eye not operated upon, he is allowed to move about in the bright twilight of the room, to dress himself and to feed himself, and therefore, escape the many discomforts of confinement, sometimes so marked in old patients. This course of practice with me is no longer an experiment. In the beginning I treated a number of cases with both eyes closed, in bed, and also a similar number with one eye opened. As I found no difference in the first results of treatment, but the comfort of patients enormously increased by the mittigation of restraint, I made bold to adopt the open treatment as my daily practice. Now I never close the eye not operated upon, and seldom put my patients to bed, leaving them to sit up in the ward if they prefer it.

Regardless of my preconceived theory, these are the facts which my six years experience have brought for me. I offer them to you as I know them, suggesting, for your patient's comfort, a trial. My practice has not suffered by the abandonment of a method of treatment, however classic, ancient or generally adapted.

My experience has taught me that the tying up of both eyes, after cataract extractions, and keeping patients in bed, and in the dark is useless, needless and annoying, because they will do quite as well without any of this restraint.

RELATION BETWEEN DISEASES OF THE UPPER AIR-PASSAGES AND DISEASES OF THE EYE.

By J. G. CARPENTER, M. D., Stanford, Ky.

Phylyctenular conjunctivitis and keratitis are largely dependent upon a present or pre-existing rhinitis.

Megrim, ciliary neuralgia, asthenopia, passive congestions and inflammations, and reflex irritations of the eye are often cured only by treating the disease in the upper air-passages upon which they depend. Treating the eye alone, or correcting the error of refraction, only partially curing or relieving some of the prominent symptoms, and finally treating the nasal chambers, effects the cure.

Diseases of the teeth have for a great while been considered causes of eye complications. Beside the various forms of rhinitis causing disease of the eyes, the presence of a polypus, adenoid growth, diflected septum, a fibroid, exostosis, polypoid hypertrophy of one or more turbinated processes, or adhesion of a hypertrophic turbinated process to nasal septum, a foreign body or rhinolith will cause nasal stenosis, mouth-breathing, pressure symtoms, local and reflex irritation, passive congestion of nasal chambers, nasal duct, lachrymal sac; frontal, ethmoidal and spenoidal sinuses, the eye, ear, trachea, antrum, pharynx, larynx, and reflex irritation of the heart, stomach, head, chest, brain and spinal cord.

The successful oculist must be an equally skilled rhinologist, or send his patients to the latter.

Heterophoria and concommitant or periodic squints have been reported due to some intra-nasal affection.

An enlarged turbinated process, enchondroma, polyp, exostosis or fibroid may press on the mouth of nasal duct and cause obstruction by direct pressure, or passive congestion; or the rhinitis may extend by continuity of tissue to the lining of nasal duct, causing narrowing by tumefaction of lining, or by contraction through atrophy, of the lachrymal sac, canaliculi and conjunctiva.

When we consider the lymphatic, vascular and nerve supply anatomically and physiologically of the eye, ear, nose and throat, and the pathology of diseases of the upper air-passages, the clinical history of individual cases, the relation of diseases of the upper air-passages and accessory cavities to diseases of the eye is easily explained.

The deep lymphatic vessels of the face are derived from the pituitary membrane of the nose, mucous membrane of the mouth, pharynx, and the contents of the temporal and orbital fossæ. They accompany the branches of the internal maxillary and end in the deep parotid and cervical lymphatic glands; obstruction of the nasal chambers causing pressure on the lymphatic vessels would cause passive congestion of them in the orbit and its contents as well as, in the veins and arterioles.

Cases of keratitis with ulcer of cornea made no progress for weeks until the hypertrophied turbinated processes were cauterized and shrunken, curing the nasal stenosis. Rapid improvement and recovery of eyes soon followed.

The iris, by its circumference is intimately connected with the choriod (external to this is the ciliary ligament), and to the cornea by the ligamentum pectinatum; the latter is derived from the membrane of Descemet, some fibers of which are connected with the fore part of choroid and sclerotic.

The pigment cells are several layers of small, round or polyhedral cells filled with dark pigment cn posterior surface of iris and continuous with the ciliary processes.

The ligamentum pectinatum joins the iris to the ciliary muscle and choroid, the longitudinal fibres of which run back to the retina, (pigmented layer), so-called choroidal layer, and which goes from the iris to the optic nerve.

The arteries of the iris are derived from the long and anterior ciliary, and from the vessels of the ciliary processes. The nerves of the iris are derived from the ciliary branches of the lenticular ganglion and the long ciliary from the nasal branch of the ophthalmic division of the fifth.

After reaching the iris in the manner described above, they form a plexus around the attached margin of the iris; from this are derived non-medulated fibres which terminate in the circular and radiating muscular fibres. Their exact mode of termination has not been ascertained. Other fibres from the plexus terminate in a network on the anterior surface of the iris. The fibres which are derived from the motor root of the lenticular ganglion (third nerve) supply the circular fibres, while those derived from the sympathetic supply the radiating fibres.

Past experience and observation have demonstrated the conjunctivitis, keratitis, iritis, kerato-iritis, asthenopia, corneal ulcer, episcleritis, spasm of accommodation and irritability and congestion of retina and choroidal lesions around the disk, have for their predisposing cause, long continued rhinitis with constitutional dyscrasia, or local disease in nasal chambers setting up reflex irritation and congestion of one or more tunics of the eye.

To the author, there is no doubt that the nutrition of the eye is interfered with by these factors, and that chronic rhinitis from future observation will prove to be one of the factors of heterophoria, and it is conducive to hyperopia and myopia.

The acuity of vision is often greatly improved by treating the nasal chambers and throat, and if an opthalmoscopic examination and test of vision was also made with the rhinoscopic examination before and after treatment, many interesting points in relation to diseases of the upper air-passages and accessory cavities to diseases of the eye would be revealed. Unfortunately many rhinologists are not ophthalmologists, and many oculists are not rhinologists.

Prof. S. D. Risley has said, The more we know about the physiology, anatomy and pathology of the choroid, the better oculists we become. This axiom might be supplemented by stating that the more we study diseases of the eye in connection with diseases of the upper air-passages, we become the greater benefactor to our patients.

A SIMPLE MUSCLE TEST.

By C. M. Hobby, M. D., Iowa City, Ia.

For the purpose of determining the relative directions of the axes of vision of the two eyes, when effort at co-ordinating towards a common point, and effort to coalesce retinal images are both suppressed, I have found the use of a glass so densely colored as to cut off the vision of all except luminous objects to be decidedly more efficient than Stevens' Phorometer, the double prism, or the Maddox rod. All prism tests disturb, but do not entirely suppress, attempts at co-ordination, the relation of surrounding objects is involuntarily taken into consideration, and while the Maddox rod is more efficient, it, too, fails to give entire rest to co-ordinative impulse. By using a glass so densely colored as to cut off the view of all objects other than the small light (preferably in a dark room or used with the dark room for a background), the desire to fuse images is suppressed, and by using a chart of squares behind the light the displacement of the second image is quickly found. The test introduces no disturbance of muscular action or accommodation, is extremely simple, and it will detect smaller amounts of heterophoria than the phorometer or the rod; and it demonstrates that orthophoria is as rare as emmetropia.

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY, BRITISH MEDICAL ASSOCIATION.

The annual meeting of the British Medical Association was held this year in Bristol. The Section of Ophthalmology was called to order by Mr. Cross, President of the Section, at 10 a. m., August 1st. He announced that the material to be presented to the Section was so abundant that he would not make the usual opening address, but would occupy only a minute or two in making some brief statements. He congratulated the Section on having present a large number of oculists from foreign countries. To the visitors from Europe, Asia and America, Mr. Cross extended a hearty welcome, announcing that some of these visitors would read papers, and he hoped others would join in the discussions.

The first paper was read by MR. SIMEON SNELL, of Sheffield, Eng., on

"THE RELATION OF OCCUPATIONS TO EYE-SIGHT."

Under the head of toxic amblyopia, he presented a study on the influence of bisulphide of carbon on the vision of employees engaged in the manufacture of rubber. He stated that the vapor being heavy sinks, and in this way is more likely to be inhaled, thus causing poisoning, one manifestation of which is the disturbance of vision. Among the causes of toxic amblyopia, he mentioned tobacco, but stated that a toxic effect rarely, if ever, occurs as a result of handling the tobacco in the various forms in which it is manufactured.

In speaking of the influence of lead on vision, he stated that it causes optic neuritis, which is likely to result in atrophy. He taught that where persons were exposed to intense light and heat, as in glass blowing, the manufacture of iron, etc., he believed the disturbance resulting was due more to the light than to the heat, although there were some who believed the heat was the cause of trouble. In electric welding the author thought the pathological conditions excited due to the chemic rays. He also taught that the ordinary electric light may cause trouble by exciting irritation in the cornea and conjunctiva.

He urged that all employees, engaged in work where particles are liable to fly off with greater or less force, have their eyes protected by large plain glasses. He thought that in this way the large number of lost eyes among workingmen would be greatly reduced. (Dr. Snell's paper will be published in full in an early issue of the Record.)

In connection with Dr. Snell's paper, was read the following paper on

THE EFFECT OF PROLONGED EXCESSIVE LIGHT ON VISION.

By GEORGE LINDSAY JOHNSON, M.D., F. R. C. S.

Some time ago Dr. Salviati, the Director of the well-known Venetian Glass Works, told me that his workmen who were employed in the furnace room, invariably lost more or less of their sight after some years had elapsed, and he asked me whether I thought something could be done to prevent this.

Accordingly I undertook an examination of the workmen's sight, and of the conditions under which they worked.

I found that the workmen spent their time in a large vaulted room, imperfectly lighted, in the centre of which was a large circular furnace. In the wall of the furnace were four large apertures, about three feet six inches broad, by three feet high, and narrowing down to half the width on the inside. These apertures could be completely closed by vertical sliding doors, but as the workmen had to withdraw and insert continually, pieces of half melted glass, the apertures were only closed when they were not in use. Thus, during most of the time that the workmen were busy, they stood looking at the melted or glowing glass, and at the floor of the furnace, glaring with white heat and surrounded by intensely bright and vivid flames.

I found that the men thus employed all had defective vision, the more defective, the longer they had been employed in the furnace room. I found that the optic nerve gradually became atrophied with a consequent diminution of the visual field.

The opthalmiscope revealed a pale disc, retinal vessels of diminished size, and in some cases a disturbed condition of the pigment. In no case, even in those who had worked as long as forty years at the furnaces, did I find complete atrophy, but in the worst case the vision had sunk to Sn. $\frac{20}{70}$.

The following are a few examples.

INITIALS.	AET.	YEARS AT WORK AT THE FURNACES.	VISION WHEN EXAMINED.
V. Z.	28	$1\frac{1}{2}$	$\frac{20}{30}$
G.	30	5	$\frac{20}{40}$
G. B.	39	30	$\frac{20}{50}$
Y.	52	40	$\frac{20}{70}$
G. G.	48	36	$\frac{20}{30}$

I was informed that all these men had perfect vision when they first began work at the furnaces.

The last mentioned case had only occasionally worked at the furnaces, being mostly employed elsewhere.

I found that in no case did workmen who were exposed to the glare of the furnace for more than one year escape without the permanent loss of some of their vision, whilst others who were exposed to the heat only, had no impairment of sight. This would point distinctly to the glare, and not to the extreme heat, as the cause of the injury. But, whether it is the intensity of the light, or the peculiar nature of the light given out by the furnace, I am not able to determine as I had not opportunity of examining the light spectroscopically. I regret that I was unable to do so because we know by the ingenious experiments of Dr. Widmark* that the ultra violet rays possess the power of producing marked pathological changes, and I have found that the red and ultra red rays have also a marked effect. Widmark found that the violet and ultra violet rays produced on the skin and conjunctiva effects resembling an ordinary erythema followed by desquamation. Direct sun-light, the reflexion from snow, and the arc light are therefore found to produce similar effects.

I have bred rabbits under spectrum red glass, and have made microscopic sections of their eyes. Other work has prevented me from carrying out my experiments in this direction to the extent I would have desired, but from the facts before me, I have every reason to believe that the red and ultra red rays tend to exhaust the retina. The sections of the eyes of rabbits bred under the above conditions show a marked diminution of retinal and choroidal pigment as compared with the eyes of rabbits bred in the open air.

It is well-known that photographers and photographic plate-makers have suffered severely from the effects of red light, in consequence of which a canary yellow or orange medium is used by them wherever practicable.

The prolonged excessive action of either end of the spectrum seems equally pernicious, although acting in a different and possibly opposite manner, but the action of either does not seem to produce any permanent effect, except by long and continued exposure. Nature seems to struggle in order to eliminate the irritation, and succeeds in maintaining the tissues in health for a considerable time, but ultimately the nerve cells lose their activity and power of resistance, and they become more or less replaced by connective tissue. In this respect we may compare the action of prolonged excessive light to the prolonged over-indulgence in alcohol.

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*Nord. Med. Arkir 1889, Vol. XXI. 1.

We must clearly distinguish between the effects of direct sunlight on the retina, and that of the furnace glare. The former injury, as Deutschman has clearly shown,* is produced by the rays of the sun being directly focussed on to the macula, and causing an actual cauterization of the retinal elements, a coagulation of the albumen, and a fusing of the retinal layers into a structureless mass. In the case of the furnace glare there is no immediate structural change in the retina, the process being *in every case* a chronic one.

I regret to say that I was unable to carry out my observations at Salviati's Glass Works as thoroughly as I would have desired, on account of the extreme superstition and prejudices of the Venetian workman, who seemed to have a much greater dread of the influence of the evil eye than of the danger of losing his own.

The third paper was read by Mn. Beaumont, of Bath, on the subject:

"THE SOLDIERS RED COATS AS THE CAUSE OF RETINAL HYPEREOTHESIA."

In this paper he gave the history of an army officer who had great temporary reduction of the acuteness of vision, or entire loss of vision for a time, whenever he looked at a soldier's red coat, at a red shawl, or at red blotting paper; in fact everything that was red produced this temporary effect on his vision.

The three papers were discussed together.

Mr. R. W. Doyne, of Oxford, was first to discuss.

He gave the history of a case in which trouble was excited by the arc light—In reference to Mr. Beaumont's case he said the patient was a neurotic one, and thus he was easily disturbed, in this peculiar manner, by a very unusual cause—He argured against the use of dark glasses when there was functional irritability of the eyes, claiming that they aggrevate the condition in most instances. In the course of his remarks he also spoke against the advise, not to use the eyes, so frequently given to patients suffering from incipient cataract.

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*Graefe's A. F. O., XXVIII, 3. p. 241. et. seq.

Dr. Geo. T. Stevens, in discussing Dr. Snell's paper, emphasized the importance of protecting the eyes of stone-cutters. He stated that, while a large building was in process of erection near his office, a very great number of the employees engaged in the stone work came to him to have particles of stone or steel removed from their corneas.

Dr. E. Landolt agreed with the author of the paper that persons engaged in the manufacture of glass, are especially predisposed to cataract. He stated that foreign bodies, of whatever kind, when embeded in the cornea, should be removed with the greatest care, otherwise a scar would result. He then stated that he was in the habit of removing these bodies with a small paint brush.

Dr. G. M. Gould stated that he had for some time been in the habit of removing foreign bodies by means of a little pledget of absorbent cotton wrapped around the end of a probe or toothpick.

Dr. DeSchweinitz said he had seen one case of tobacco amblyopia developed in a girl engaged in a tobacco factory. She worked most of the time in what might be called an infusion of tobacco, with her hands and forearms submerged in the liquid. He had her abandon her work, gave her proper treatment and obtained a good recovery.—He stated that he believed that very great heat was a common cause of choroidal trouble and cataract. He does not enjoin rest of the eyes in cases of incipient cataract.

[These discussions will be continued in the next issue.—Ed.]

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THE PATHOLOGY OF GRANULAR CONJUNCTIVITIS.

By H. V. WÜRDEMANN, M.D., of Milwaukee.

CHAIRMAN COMMITTEE ON OPHTHALMOLOGY AND OTOLOGY.*

(Director Wisconsin General Hospital; Oculist and Aurist Children's Hospital; and to the Milwaukee County Hospital for Chronic Insane; Instructor in Eye, Ear and Throat, Elms Hospital; and to the Milwaukee County Hospital, Training Schools, etc.)

The symposium on the subject of granular conjunctivitis, arranged for your delectation, deals mainly with the treatment of that disease. Therefore, in the remarks which I have to make upon its pathology, I shall endeavor to prepare the field for the other speakers, to call special attention to those points from which rational rules for treatment may be developed, and to show the therapeutic actions of the several methods of treatment by the light of recent investigations.

There are some disputed questions in regard to granular conjunctivitis, folliculosis of the conjunctiva, follicular conjunctivitis, and trachoma. Are these separate and distinct diseases, or only phases of one or more diseased conditions? Are they contagious, and, if so, does infection from one produce an exactly similar state of things in the infected person, and why is it that other persons living with such cases, giving every inducement for development of the disease, do not acquire the same? What is there in the alleged immunity of some races, and the lower animals? What is the nature of the infection? Then, again, as to some of the causes of the complications of trachomatous disease, to say nothing of the various opinions, rife as to treatment.

To understandingly discuss these questions, I would lead you to examine the normal conjunctiva, of which I have a section under the first microscope. (Fig. 1.)

This membrane varies in structure according to the portion of the eye from which it is excised and the age of the patient. In a presumably healthy adult conjunctiva, on close examination, the tarsal portion appears velvety, traversed over by numerous fine grooves and pits which go to form the papillæ, which are larger near the orbital edges and irregular in distribution, being covered over by the epithelium, cylindric on the surface and formed of three or four layers. In the first layer there may be seen many mucous corpuscles; in the others the mucous cells are less abundant, and there are many round epithelial cells filling the interstices between the cells, the lower layers being composed of flat young cells almost exclusively. The epithelium sends prolongations between the

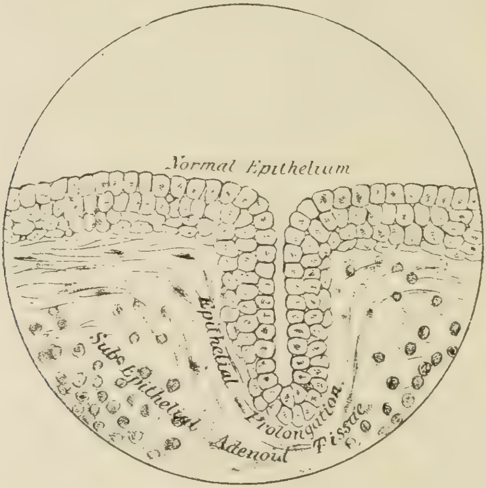

FIG. 1.
Normal Conjunctival Epithelium, showing Epithelial Prolongation.
(From microscopic specimen.)

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*Read before the Wisconsin State Medical Society, June 6th, 1894.

papillæ down into the subjacent tissue, the cells here arranging themselves into two layers. This formation plays a very important part in the regeneration of the surface epithelium.[3] There is an underlying layer of fibrous tissue, between whose elastic fibers is a diffuse adenoid infiltration, especially abundant near the orbital portion (fold of transmission, retrotarsal fold, fornix), which is gathered together in distinct masses, forming follicles. This adenoid tissue is absent in the infant, but found almost invariably in the adult, and in many animals, and hence considered by some writers to be a normal condition when in moderate quantity.[5] The orbital portion of fornix is loose and consists of many layers. The ocular portion has a flat epithelium and contains no glands or papillæ. In the orbital and tarsal portions the acino-tubular glands of Krause are found.

In much of the following I have drawn so largely from Mutermilch's recent and valuable articles in the Annals d'Oculistique[3,4] that it is impossible to credit him fully with each individual sentiment. I may say, however, that his statements as regards the pathological anatomy of the conjunctiva and the inferences therefrom to be drawn are readily corroborated by the careful observer. I have made many microscopic examinations of small portions of the normal and diseased conjunctiva, from some of which the drawings accompanying this article have been made.

According to his classification[3] all inflammations of the conjunctiva belong to one or pass through three distinct stages.* I. Those catarrhal forms where the functions of the cells with reference to their multiplication and the production of mucus is increased. *Stage of Proliferation.* II. Where there is destruction of the mucous elements. *Stage of Superficial Destruction.* III. All those grave inflammations which though well held apart by microscopic signs have a common characteristic, the destruction of all epithelial elements on the surface of the conjunctiva. *Stage of Total Destruction.* Most chronic affections of the conjunctiva originate as a result of the acute disease. In this, as well as in chronic affections, there exists a constant relation between the clinical manifestations and the appearance of the epithelium, the alteration of which is the only constant anotomo-pathologic phenomenon.[3]

I. In the beginning of an inflammation the epithelium differs but little from that of health, the mucous corpuscles develop with greater energy producing discharge of a mucus composed of immature corpuscles and young epithelial cells, the latter of which have come to the surface. The sub-epithelial tissue becomes infiltrated and a few follicles form from the broken down tissue and from leucocytes which have penetrated between the epithelial elements. Here the epithelial layer remains unbroken and differs but little from the normal. (See Fig. 2.) The milder catarrhal affections caused by local irritants and slight degrees of local infection stop at this stage, in which the disease is mainly confined to the surface cells and dis-

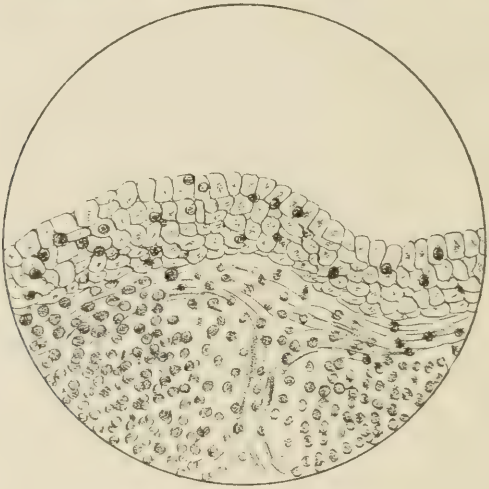

FIG. 2.

Stage of Epithelial Proliferation. (From microscopic specimen.)

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*Different portions of the membrane from different parts of the tarsal conjunction may exhibit the various stages at the same time as above described.

appears upon removal of the cause or light remedial treatment.[3] In some cases but little irritation may be necessary for production of the follicle. Indeed these formations appear independent of perceptible inflammation[3] and we often see seemingly healthy eyes whose tarsal folds appear to be crowded with follicles. (See Fig. 2. Conjunctival Folliculosis.) These growths are similar microscopically to those found in the trachomatous state and the same variety of germs have been found in each condition.[3] The efforts of nature alone and mild antiseptic instillations, boric acid. corros. sub., zinci sulph, protection of the eyes from cause or simple removal of the secretion by hot bathing will often suffice for the return of the epithelium to health.

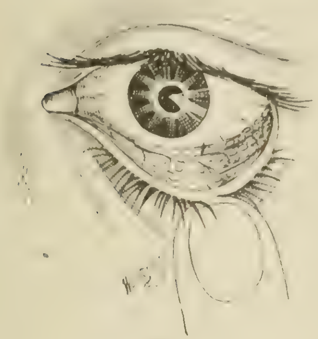

FIG. 3.
Conjunctival Folliculosis. (Sketch from patient.)

II. When the process goes on and the young epithelial elements become transformed into mucous cells, running into each other in masses of degenerated cells, forming follicles. (See Figs. 4 and 5). The clinical manifestations are not many, although the lids may be crowded with follicles. I have had many patients who experienced but little discomfort although the retrotarsal folds were greatly swollen, and the chief source of complaint was the sleepy appearance caused by the ptosis.

Although there are many leucocytes in the subepithelial tissues there may be but little suppuration. The palpebral folds thicken through disease and crowding together of the follicles.

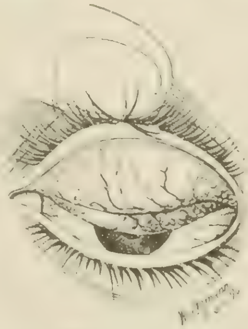

FIG. 4.
Follicular Conjunctivitis, or Follicular Trachoma.

This is the stage of hypertrophy and is an "*intermediate phase uniting in one evolutional stage the most simple forms of catarrhal affections to trachoma.*"[3] It is difficult to entirely separate it from the first stage by the clinical signs from which it only differs in degree. Some specific inflammations stop at this stage, even though great swelling and great proliferation of the epithelium occurs, and proceed to partial resolution, which so far as concerns the patient, is a practical restoration to health. Some of the acute catarrhs, and those forms usually denominated follicular conjunctivitis, hypertrophic conjunctivitis, and the milder forms of follicular trachoma belong here.[3] Although much of the superficial layer of the epithelium may be lost that portion which has been spoken of as dipping down into the tissue between the follicles remains practically unaffected and in the process of resolution comes to the surface relining the lids with epithelium. Here the morbid destructive process has not been great and consecutive connective tissue deposit does not occur, hence no gross scars form. This stage is not attended by the development of pannus, and seldom by ulcera-

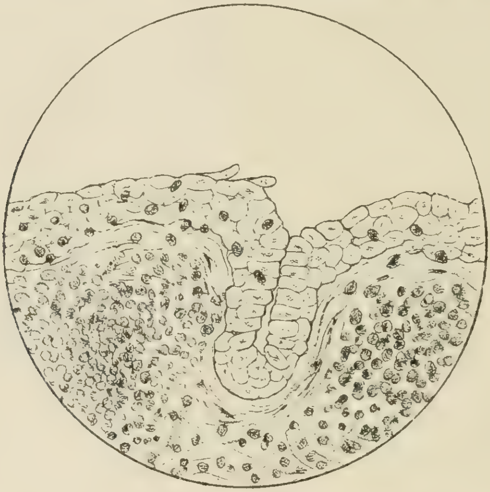

FIG. 5.

Stage of Superficial Destruction. (From microscopic specimen.)

tion of the cornea.[3] In addition to the removal of the cause and antiseptic treatment, caustic applications* aid in restoration to health by assisting in exfoliation of the superabundant mucous corpuscles and disorganized epithelial cells, allowing the return of the epithelium from the crypts to the surface and its practically complete regeneration.[5] Silver solutions and the sulphate of copper crystal also act by their antiseptic qualities, limiting the production of the irritative micröorganism. Much of the efficacy of the various massage treatments (with powdered boric acid, unguents, etc.) is due to this action, although their effect is also due to mechanical emptying of the contents of the follicles during the procedure. Here too, the various mechanical or surgical methods of treatment come into play.

We must here take up the consideration of the formation of the follicle and its relation to the general inflammatory process. When by reason of irritation from a morbific source, especially and more frequently of microbic origin, the epithelium undergoes characteristic changes, there is manifested on the part of the organism a defensive reaction, a migration of white blood corpuscles into the sub-epithelial tissue, forming under the epithelium a layer of inflammatory infiltration. These white cells not only act as phagocytes, but many, after having absorbed the products of inflammation, furnish nutrition to the diseased tissue; others die and are either eliminated in the secretion or are absorbed into the circulation. The vitality of these white cells depends upon the condition of the general organism and the general hygienic condition of the patient. Thus when oxidation of the tissue is poor, or when the system has become exhausted by constitutional disease, the white cells become enfeebled, losing their ameboid movements once they have left the blood vessels. The cells become grouped together in foci in the loose cellular tissue beneath the epithelial layer with other lymphatic cells. (See Figs. 6, 7.) In the healing process, small islands of degenerated cells undergo retrogressive metamorphosis, or are absorbed so that after the inflammatory process is extinct, no trace may be found. Thus in stage I. perfect resolution may occur.[3]

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*The digestive ferments, notably papoid, as advocated by Lydston ("Pannus and its Treatment by the Digestive Ferments," Trans. Journal Amer. Med. Assoc., 1893, and also in "Trachoma," Journal Amer. Med. Assoc., Sept. 29, 1894), owe their efficacy to the same action as the caustic treatment.

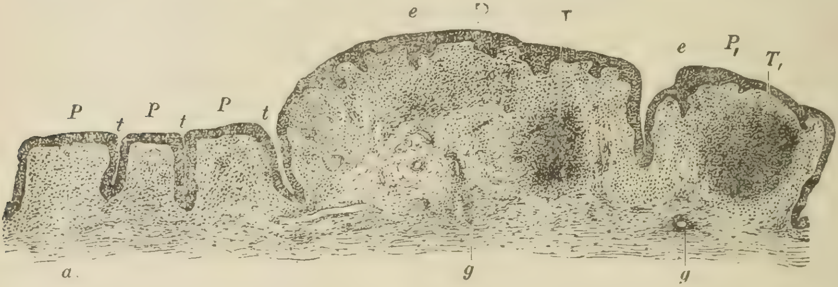

FIG. 6.

Section of Trachomatous Conjunctiva, showing Trachoma Bodies T. and Papillæ P. (Fuchs.)

But where the oxydation of tissues is lessened, degenerated cells are more numerous and larger foci are formed, rapid absorption does not take place and the cells come together in an almost uniform mass, forming nuclei of future follicles. This mass of degenerated elements is penetrated by the normal white cells and these die on account of the insufficient supply of oxygen. Thus grows the degenerated area, hemmed in by a wall of sub-epithelial adenoid tissue until it reaches a self-limited size forming the follicle. The subjacent tissue contains a network of many crossing bundles of connective tissue which, being irritated by the increasing pressure from the growing follicle, encapsules the same in a sclerosed wall at the bottom and sides forming a barrier and limiting its growth. Fusion of the follicles may, at times, take place forming those larger growths to which the name trachoma bodies has been applied. Thus under the microscope a section of a follicle or trachoma body reveals a complete ring of sclerosed tissue containing degenerated epithelial and adenoid elements and leucocytes. (See Fig. 7.) The follicle can grow only in the line of least resistance, toward the surface of the conjunctiva, which causes progressive atrophy of the overlying epithelial cells. The least traumatism is sufficient to rupture this covering, allowing the liquid contents to escape. Mutermilch says[3] that a follicle cannot be completely emptied in this way and his statement is supported by clinical evidence. I have often noticed, after very complete expression of the follicles by the roller forceps, that some of the follicles become reproduced. Thus it is that in the majority of cases the mechanical and surgical procedures must be followed by medicinal treatment. The follicles require time for their development and hence the trachomatous state cannot appear within the first few days of an acute infection and it is readily seen how they are produced, in the course of those processes resulting from slight, though constant, irritation, which do not ultimate in trachoma.

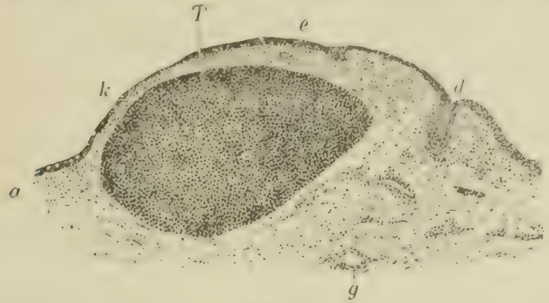

FIG. 7.
Section of "Trachoma Body" showing thinning of the Epithelium over the infiltrated mass. (Fuchs.

The follicles are the seat of two processes of opposite nature:[3] continual absorption of lymphatic cells from the neighboring tissues on the one hand, predominating at first, the follicle thus increasing in size: later, migration is lessened and reabsorption succeeds, the lymphatic cells being replaced by cellular tissue, the follicles gradually disappearing. Now, if an exacerbation occurs, when the follicle has only undergone partial resorption, the adenoid tissue has not yet lost its anatomical characteristics, the follicles are under the same conditions as at first, and so develop. During this stage of reformation the follicles may not be distinctly visible, as their outlines are merged into the mass of lymphatic tissue. But when the fibrous capsule has formed and an exacerbation occurs, connective tissue has, in a great measure, replaced the contents of the follicle, and it is gradually obliterated, its place being filled by connective tissue which ultimately replaces the adenoid tissue completely.[4] Thus the formation of the extensive cicatrices may be explained.

From this description of the formation of the follicle, it may be seen that the condition of folliculosis is not a disease *per se*, that these growths are a secondary and not a primary manifestation. They are simply the results of the reactive inflammation of the irritated tissues by which the products of the process pass beyond the proper limits by reason of continued irritation, and seldom become injurious by reason of their size. Mutermilch[4] shows that there is a certain relation between the phase of imflammatory action and the quantity of follicles, as follows: The more the disease is liable to aggravations, the smaller is the number of the follicles, as repeated and long exacerbations render the tissue denser and less favorable for their production. Thus it is that a superimposed acute suppurative inflammation like that caused by jequirity or purulent inoculation leaves the conjunctivat in a smooth state after its subsidence.

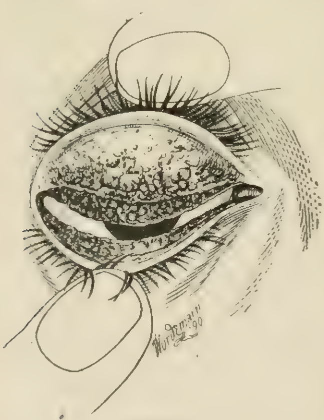

FIG. 8.
Lymphoid Trachoma.

We here come to the stage of "pernicious hypertrophy,"[8] (See Fig. 8,) which is complicated later by pannus and superficial ulcer of the cornea, to which the trachomatous state (follicular trachoma, mixed, papillary, infiltrated, lymphoid) properly belongs, and which merges gradually into the stage of total destruction of the epithelial elements. (See. Figs 9, 10.) Here the follicles are more or less abundant, but in some instances of grave trachomatous disease there are practically none.[4] They had existed at first but had disappeared little by little by reason of the reaction. At present writing I have several such patients under my care. It is only in the epithelium that we find constant changes according to the stage of the disease. The mucous cells are destroyed first, and the epithelium disappears more and more until the surface of the conjunctiva on section appears stripped of epithelium, being practically a mass of infiltrated tissue. But those prolongations spoken of as dipping into the crypts may remain, either having connection with the surface or being overgrown by the morbid tissue, forming pseudo-glands. (See Fig. 9.) When the cells of the superficial layer are destroyed, those of the prolongations begin to change, but the pathological process only touches the cells nearest

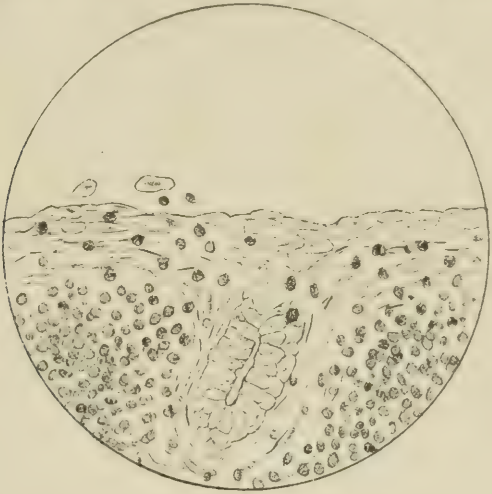

FIG. 9.

Stage of Total Destruction. (From microscopic specimen.)

the conjunctival surface, those of deeper location remaining normal during the whole course of the disease.[3] From these epithelial prolongations the surface epithelium becomes regenerated after exfoliation of the super-lying diseased tissues. From this we explain the principal efficacy of the caustic method of healing the disease in producing superficial necrosis of the tissues and allowing these epithelial islands to come to the surface.[3] To this the massage and mechanical methods owe some of their success.

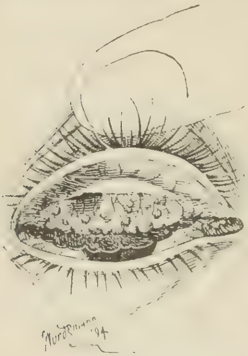

FIG. 10.
Typical Granular Lid with Beginning Cicatrization.

The stage of total destruction of the epithelial elements is characterized by one important macroscopic symptom, the *formation of pannus*, which increases as the destruction of tissue goes on.[3] Until lately it has been believed that this complication was due to the friction of the granulations, as when the disease was principally situated in the upper lid, the pannus occupied the upper portion of the cornea, and the opposite when the lower lid was principally affected. It is possible, after pannus has already started, that the mechanical irritation may have some effect, but the fact is that there is a constant relation between the amount of epithelial destruction and the corneal complication. Pannus is really the manifestation of the follicular process on the anterior layers of the cornea, which is continuous with the epithelium of the ocular conjunctiva.[1,2,3] I have under my care, at present, two patients in whom it is difficult to discover any follicles, but the presence of this complication has been quite a serious symptom. Such are frequently observed. Patients also frequently appear with the lids crowded with granulations, as it were with masses of frog-spawn, but without corneal manifestations.

The epithelial layer of the ocular conjunctiva and of the cornea passes through similar changes to that of the palpebral conjunctiva in this stage of degeneration. According as the regeneration of the epithelium on the lids takes place that of the cornea reforms, the opacities and pannus disappearing. This occurs under the moderate application of therapeutic means as argent. nit., sulph. copper and other agents which hasten the mortification and dropping off of the superficial layers. When this regeneration is little active only a thin film of epithelial cells is found which is subject to repeated degenerations from relapses, leaving spaces in which the epithelium is totally destroyed in the cornea as well as in the lids, and which fill up with connective tissue.[4] Under unfavorable circumstances the remaining few degenerated epithelial cells may be lost, and the conjunctival epithelium be replaced by a mass of connective tissue. Incidental ulceration of the deeper tissues through infection by pus germs may likewise occur. Thus the extensive scars and xerosis of the membrane are formed. In the cicatrizing process, and in the healing of the pannus (from contraction of the fibroid elements) excessive regular or irregular astigmatism may occur.[2,5,6,9] After pannus crassus permanent leucoma of the cornea results. The massage treatment by unguents aids in restoration of tissue nutrition, and thus produces some absorption of connective tissue, thinning and straightening the lids, and the corneal opacity is also cleared away.

By the aid of extensive excerpts from Mutermilch's articles and other works, I have gone rather extensively into the pathological anatomy of the chronic catarrhal affections, the formation of the follicles and the trachomatous state. The variations in macroscopic appearances of these follicles, their location, the fact that in the first and second stages complete resolution may take place without cicatrization, have led former authors (myself among others)[9] to place particular pathognomic value on these productions, and to consider that those developed during acute affections and in folliculosis and follicular conjunctivitis were of a different nature from those of the trachomatous state. By the facts herein deduced from anatomical studies of the diseased membrane we may fall in line with Mutermilch, and "*rejecting the existence of follicles of different origin, we at the same time overthrow the basis on which is founded the theory of trachoma as an independent affection.*"[3]

The other questions brought up in the first part of this paper are readily answered. Are these diseases contagious, and do like stages produce like effects when inoculated? Most writers believe both follicular disease and trachoma to be contagious. Inflammation of the conjunctiva may last for a longer or a shorter time according to the kind of microbe, the hygienic condition of the patient and the state of the organism.[4] Thus some cases are cured quickly whilst others linger indefinitely until betterment of the surroundings and constitution.[1] I have many times seen follicular disease result upon acute inflammation of the conjunctiva, and have also seen this merge into the trachomatous state; in fact I have at present such cases under my care. I have now under treatment two cases developed from the same source, one of typical follicular disease and the other of the typical trachomatous state with pannus. I have had several severe cases of trachoma with pannus in one eye whilst the other was not effected. I have seen during the last five years a number of children who, at the time of infection, attended a neighboring kindergarten to which the wealthier class of people send their children. About this time a child with undoubted trachomatous disease entered the school and since that time I have had some fifteen or more of these kindergarten pupils who have since appeared with follicular conjunctivitis and follicular trachoma, dating their eye trouble from the time of attendance upon this school. In none of these has there been any development of pannus and in all it has run a very mild though chronic course. All of the children coming to me were in a lowered condition of bodily health, or scrofulous. In one instance, where the child developed a mild follicular conjunctivitis, she infected her nurse, two other children of the same family, her father and the governess. None of these persons were in robust health. Here is seen the necessity for internal treatment of these cases by tonics, ol. morrh., etc.

Thus from personal observation I would hold that follicular conjunctivitis may follow simple catarrh or any infection of the membrane, if the conditions be favorable for its development, and may later be transformed into true trachoma, and that infection from a trachomatous eye may give rise to but slight conjunctivitis or the follicular disease or the trachomatous state. Infection from other morbific sources will do precisely the same thing if the infection be not so severe as to cause an acute reaction by which the products of inflammation are reabsorbed, and moreover the disease itself not be self-limited (like acute suppurative conjunctivitis).[4] Inflammations of the conjunctiva vary according to the cause or kind of infection, and there may be a wide difference in their clinical manifestations. It is not here taken that a simple catarrhal conjunctivitis is the same form of disease as granular lids, but it is beyond dispute that given the favorable environment, any conjunctivitis may be the precursor of the other state, and hence our prognosis in acute conjunctival affections should always be guarded.

Why is it that inoculation experiments, such as I have personally made upon rabbits and other of the lower animals, have usually failed? The experiments of Staderini show that inoculation in a healthy animal gives negative results, while those in a bad state of hygiene were uniformly successful.[4]

In four years experince* with negro patients in two largely attended clinics, I have personally seen but two cases of the trachomatous state in this race. This immunity of the American negro has been corroborated by the published observations of Burnett and others. Yet I learn that in Egypt and the Holy Land the disease is as relatively prevalent among them as among other tribes and races. Veneman followed up 100 cases for years in regard to infection in the family. These were in daily contact with 497 other persons, of whom forty only were attacked, all the others escaping. When endemics appear it is found that they usually take place in secluded institutes, and mainly on account of the hygienic surroundings: the healthy persons always escape. The circumstance that the disease is so frequently connected with the place speaks against its contagious character, in healthy persons.[7] Thus dietetic and hygienic treatment are generally indispensable.

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*Washington, D. C, 1885-1889.

Now in regard to the oft claimed specific micro-organism.* If trachoma and follicular conjunctivitis be separate and distinct diseases, then each one must, according to its infectious character, be provoked by a specific microbe. "There have been as many kinds of microbes found as investigators," and inoculation experiments with each give negative results, when made by others than the discoverers of the alleged specific microbe.[4]

To recapitulate:—Trachoma and follicular inflammation are not independent affections but are diseased conditions resulting after infection from various sources. The trachomatous state follows that of follicular inflammation through which it must have first passed. Infection from either may give rise to simple conjunctivitis, but coupled with poor hygienic surroundings, either or both conditions may develop in the individual receiving infection. In most cases of granular conjunctivitis, dietetic, hygienic and general treatment is as necessary as are local applications.

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*The normal conjunctiva is known to foster several kinds of microbes, and an eye from which mucus is running furnishes a fertile field and rich food for various forms of such organisms. In an investigation made several years ago, I found a half dozen varieties of pathogenic germs.

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805 Grand Avenue.

ON THE VALUE OF MECHANICAL AND SURGICAL TREATMENT OF CHRONIC TRACHOMA.(1)

By Dr. ED. PERGENS, of Maesyck, Belgium.

Translated by Dunbar Roy, A.B., M.D., Atlanta.

Although it is here difficult to make a distinction between surgical and mechanical treatment, yet both of these terms are pretty generally used. As a rule Massage as well as Keinig's method is taken as a type of the mechanical, while excision, that of the surgical treatment. Besides these, there are many other methods used after the manner of massage, as, for instance, expression by means of the fingers as well as with Himly's fenestrated pincetts, Prince's ring forceps, and the instruments of Knapp and Noyes. The scratching of the granulations by means of sharp objects, needles, currettes, pumice stones, or different kinds of brushes, belongs more especially to surgical methods, unless, however, the conjunctiva is simply brushed, followed afterwards with the application of strong antiseptics according to the method of Monolescu.[2] Abadie's[3] method is to use in addition also the thorough scarification of the conjunctiva, while my procedure is to go still deeper and cut into the tarsus. In regard to excision at the fold of transition, I will not speak further than to say that this method has been used by me in very rare instances.

According to Raehlman's[1] investigations as well as is shown by my own preparations, if the follicles have increased to a distinct mass, they are very apt to be transformed into a small abcess on account of pressure necrosis, and its attendant results for the nutrition of the overlying tissues will be so interfered with, that the softened mass contained in the follicles will break through the necrosed epithelium at that spot. As a result of this latter comes the formation of scar-tissue. The massage of the lids, as also the expression by means of the fingers, produces an evacuation of the follicular contents, this latter consisting of a mucous-like ground substance in which are found free cell-nuclei, lymph cells, Raehlman's fibrin threads and granular detritus. With Keinig's procedure, a similar picture is found with the exception that red blood corpuscles are frequently found in addition. The expression with the fingers gives an almost identical result, while with Himly's fenestrated pincetts, or with Kapp's roller forceps, one finds more blood without observing such large flakes of epithelium. With brossage (or brushing) one finds still further an almost identical picture, with the exception that there is much more blood, constituting as it does, the chief mass. With tarsal incision a similar picture is presented.

In order to be able to study the exact worth ot these different methods, I cut out before the treatment a small piece of the tarsus and conjunctiva for the purpose of making a microscopic examination of the same to be compared with like microscopic examination of similar pieces removed after the treatment. In addition, at shorter and longer intervals, small pieces were again cut out in order to note the progressive changes. The material for these examinations was furnished partly by patients who, having suffered from entropion, were operated upon after the method of Snellen, and where some of the conjunctiva was removed at the same time—partly by such as had suffered from ptosis due to trachoma and had been operated upon by excision and finally by such as offered themselves for a pecuniary reward only. In a cursory manner I shall present the results in these cases, deferring until later the publication of the cuts as well as the details of the same.

Massage showed a partial emptying only of the degenerated follicles while the main bulk of their contents remained undisturbed. The same thing was seen likewise, in Keinig's method, even though a better result was expected since the slight inflammation which occurred at each operation seemed to produce a partial absorption of the follicular contents. The expression by means of the fingers only partially emptied the follicles, while the scarification with a needle was very tedious and produced an emptying of the follicles only at that point where the follicles were broken. Himly's pincetts and Knapp's roller forceps, one branch being placed upon the lid, caused an inflammation of the tarsus recognizable through the softening and separation of its fibres from one another and the ultimate partial absorption of the trachomatous nests found there between them. The brossage (or brushing), according to Monolescu, eradicated the conjunctival granules fairly well, and where only such exist, a cure may be expected; however, according to my observations, where the brossage was combined with scarification of the conjunctiva, those cases gave a much better result. In many of the cases I went still further, and thoroughly scarified the tarsus in order to expose any trachomatous nests that could there be found. Even this latter was insufficient, for pieces cut out showed still the existence of the disease. The after-treatment consisted always in rubbing the parts with sublimate solutions 1-500 every day, or every second day. Therefore, my observations lead me to conclude that while these various methods of treatment do not possess that value of restoring the parts to a normal condition, they yet promote and hasten the natural course of the disease by causing the follicles to be emptied and cicatricial tissue to be formed sooner than would otherwise take place, and through the inflammation thus occasioned to aid in the absorption of the morbid products. The only results considered were in regard to those granulations yet remaining. Furthermore, in those cases where macroscopically, nothing more was to be seen after some time (i.e. eighteen months), the microscopic examination showed, at all times, the existence of the disease. The openings of the follicles were covered with epithelium in just that manner as was pointed out by Raehlman to exist at the natural openings —the under portion being sclerosed.

I am not able to cite any great number of cases, although 29% of my eye patients were suffering with trachoma. By the majority of patients the brossage method of treatmeat was very unwillingly accepted. I have performed twenty-nine brossages, of which four were done according to the method of Monolescu, thirteen according to that of Panas, and twelve as I mentioned above with scarification of the tarsus. The four cases treated according to Monolescu were examined microscopically beforehand, and three after the brossage treatment. Two of these, which, after three weeks, showed healing macroscopically, under the microscope still showed the presence of the disease. All of these four had a mild return of the trachomatous process within two years. These as well as the succeeding cases also had tarsal trachoma. Of the thirteen treated according to the method of Panas, seven were seen again, of which five were healed macroscopically. They were again seen from three months to one and a half years after the operation, and in two cases a small piece was excised, in both of which there was still seen the trachomatous process. Two others of the seven cases seen had relapses from two to six months afterward. These were now brossaged and incisions made into the tarsus, but they again relapsed. Of the twelve patients treated by thorough tarsal scarification, eight were afterwards seen. Of these eight, three suffered from a relapse of the granular trachoma, one after three weeks, one after a month, and the third immediately after the operation. The two last have already been mentioned above. Two others developed follicular catarrh in about three to fourteen months afterwards, which readily yielded to a collyrium of acetate of lead in from three to four weeks. The other three (eight to twenty-nine months afterward) were macroscopically healed. In two of these I made an excision and found still the presence of the disease. That condition of non-activity, which sometimes take place in a trachomatous process, can remain in that condition for long periods and be looked upon as a partial cure, but a complete healing in the true sense does not take place. However, I will not dispute the fact that a complete healing of the trachomatous process may take place, especially if the case is treated with brossage at every relapse. In my cases, however, I was unable to prove that such is the case. I must confess that in these cases of mine the trachomatous process was very severe, for among 349 trachomatous eyes, complications occured in 226. Notwithstanding all this, these methods are not to be rejected on this account, for in the same length of time the patients are more improved under these methods of treatment than they would be under the use of nitrate of silver or copper.

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SCIENTIFIC PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY, A. M. A., AT SAN FRANCISCO, JUNE, 1894.

ABSTRACT OF THE ADDRESS

By A. R. BAKER, M.D., Chairman.

Calling attention, at the outset, to the fact that much valuable time is lost in the meeting of our societies, the Doctor laid stress upon the point that the rehash of views, and quoting of authorities, was a serious drawback to progress and the spirit of investigation.

He showed, by quoting from works dating as far back as 1741, that some of the so-called recent operations for special conditions, are simply modifications of methods then in use.

He points out some lines of thought along which it is hoped that those of an investigative turn of mind will apply themselves, and report at the next meeting of the A. M. A.

The tendency to supply every village with a so-called oculist, is condemned, while he insists that each general practitioner should understand the use of the ophthalmascope as a diagnostic instrument.

The reason for the unsatisfactory condition is found in the fact that not enough time is given in the schools to the study of ophthalmology, so that the general practitioner may be prepared to meet the demands made upon him, and not be forced to call in help too frequently.

REPORT ON THE VALUE OF OBJECTIVE TESTS FOR THE DETERMINATION OF AMETROPIA: OPHTHALMOSCOPY, OPTHALMOMETRY, SKIASCOPY.

By Special Committee of the Section on Ophthalmology of the A. M. A. Edward Jackson, M.D., Chairman: S. M. Burnett, M.D.; H V. Wurdemann, M.D.; J. L. Thompson, M.D.

This committee agrees that while these methods of examination are most valuable, yet they are not intended to replace the subjective tests as ordinarily followed. The subjective tests are limited to certain patients, while the objective tests are introduced to save time, and also to act as a check upon the subjective tests in many cases.

The committee suggests the following order, in the use of these tests:

Ophthalmoscopy. In the hands of the skillful, the state of refraction can be approximated and its relation to vision immediately known. They do not claim that the latent hyperopia can be determined, nor that the observer can always obtain equally good results, for there are obstacles offered both by the observer and the patient.

Opthalmometry or Keratometry. This gives quickly the principle meridians, and the approximate amount of astigmatism, without the use of a mydriatic. They do not claim that this methed is absolute in results, but rather an indicator of what we may expect to find.

Skiascopy. They regard this the most reliable of all these methods, since it measures the total refraction in any or all parts of the field.

The committee suggests the employment of all these methods in the order named.

THE PHYSIOLOGY OF CERTAIN OCULO-MOTOR PHENOMENA WITH RESPECT TO SOME RECENT THEORIES OF ASTHENOPIA.

(Abstract.)

By F. B. EATON, M.D., Portland, Or.

Physiology is the basis of scientific medicine; a criterion of the value of clinical observation; the base-line from which we are to estimate every real or apparent deviation from the normal functions of the human body. A number of theories have appeared in our ophthalmic literature which, when critically analyized, have little or no substantial scientific foundation. Physicians whose training has disciplined them to think logically, have assumed a conservative attitude towards these theories.

Their authors do not marshal their facts or make correct inferences from their premises. They pursue a deductive, rather than an inductive, method of reasoning. Some of these attractive hypotheses have attained a wide popularity. During the past five years, particular attention has been directed to the oculo-motor apparatus and detection of errors of muscular equilibrium; that is to heterophoria. I shall endeavor to analyze some of these theories concerning the origin of asthenopia, and demonstrate wherein they agree with the established principles of physiology and the facts of clinical experience.

Consider first, Dr. G. C. Savage's theory of "Insufficiency of the Oblique Muscles," as a cause of eye-strain. This has been termed "Cyclophoria." (Phenomenon of rotation demonstrated as seen with Maddox prism.) That this phenomenon is physiological, and that the eyes normally rotate outward on line of fixation in convergence, can easily be verified with or without prisms. One way is by Le Conte's modification of Meissner's experiment for determination of the horopter. This demonstrated; also my own experiment of converging upon a knot in middle of a horizontal thread. This rotation increased by looking upward, decreases on looking downward, and at forty-five vertical meridians of retina are parallel. Evidence of Hering is the same; also that of Landois.

This rotation is considered abnormal by Dr. Savage, and he has based a therapeutic method upon it, the value of which, in the writer's opinion, he has failed to substantiate by adequate clinical evidence.

Another theory of Dr. Savage is: "The Harmonious Symmetrical Action of the Oblique Muscles in all Cases of Oblique Astigmatism," based upon the assumption and supposed proof that the cylindrical deflection of the retinal image produces a disturbing diplopia unless neutralized by a compensatory rotation by the obliques.

Analysis of deflection of images by cylinder given by Dr. J. A. Lippincott. Effect of this deflection when cylinder approached to the eye. Analysis of Dr. Savage's drawings illustrating this deflection of retinal image. Writer demonstrates that the entire images of two retinae would coincide less after such rotation.

Views of Dr. H. Friedenwall on cause of Binocular Metamorphopsia; also those of Dr. Lippincott. They are irreconcilable with Dr. Savage's theory.

Conclude: 1st. The phenomena included under the term "Cyclophoria" are physiological, being the result of the normal rotation of the eyes in convergence.

2nd. The phenomena in no way disturb binocular vision, owing to the habitual toleration or neglect of the incoincident positions of the retinal images outside the immediate area of rotation.

3d. A compensatory rotation of the eyes in cases of oblique astigmatism does not take place; if it did, it would defeat the very object for which it is invoked by the author.

4. If the laws of optics would admit of the alleged correction, it would not be necessary or expedient, since it would render stereoscopic vision impossible.

Another theory, is termed by its author, Dr. Geo. M. Gould, "Innervational Abnormalism the Cause of Heterophoria." He asserts the heterophoria is principally innervational, and that it is not a question of tendon-insertions or "muscular strengths." His method is that of carrying the "weighted convergence-stimulus from the near to the distance," by the use of prisms.

This view opposed as not in accordance with physiological facts; also, as not supported by practical experinces of the ophthalmic surgeon.

Physiologists show that relations existing between nerve centres and muscles are not inflexible. These laws stated. Effect on length tensions, and innervation of ocular muscules by embryonic variations of the orbit, and insertions of the muscles.

Prism-adduction mainly results up to certain limit in developing the positive portion of the relative range of convergence for distance; further than this limit, in habitual over-convergence and accomodation.

The method, to a certain extent, does correct innervation, but beyond certain limits the muscles are gymnastically exercised. (With 40° total equal to 6 metre-angles).

The method is of value in rapidly renderingman ifest the positive range of convergence for distance, and the negative portion for the near.

In lateral heterophorias, complicated by vertical tendencies, the method is of no value.

DISCUSSION.

Dr. Edw. Jackson, of Philadelphia: The reader of the paper has perhaps made the best use of the time of the Section in calling attention to current errors, which are frequently very misleading to those who are not especially interested in the particular subject. I quite agree with him that the rotary displacement of the image caused by oblique astigmatism is entirely insignificant, but the cylindrical lenses placed before the eye to correct such astigmatism will cause such rotation of amount sufficient to be of very practical importance for the images of all lines not parallel or perpendicular to the direction of the cylinder axis. This rotation is the cause of very serious inconvenience in the first wearing of cylindrical lenses, and this inconvenience may prevent the wearing of correcting cylinders by persons whose astigmatism has remained uncorrected until after fifty years of age. While in all cases it is the cause of inconvenience, in young persons the inconvenience always passes away in the course of two or three months at furthest. And this ability to accept the suddenly developed and much greater rotation of the cylindrical lens, argues very strongly against any continuance of inconvenience from the extremely insignificant rotation produced by corneal astigmatism.

Dr. Geo. H. Price, Nashville, Tenn.: The paper proposes to put in a state of doubt the question of insufficiency of the obliques, and I will use his diagrams. The claim that this condition is normal, as produced by Prof. Le Conte would be sufficient evidence if he were investigating this peculiar question, but as he is not, then I must differ from his conclusions. It is essential for binocular single vision that the images must fall on corresponding portions of the retinae, hence in the cyclophoria induced by oblique astigmatism, or insufficiency of the oblique muscles, you have this disturbed, and this disturbance must be compensated for by a rotation of the eye on its antero-posterior diameter. These diagrams which I hand you will illustrate three points. No. 1, shows the result of observing with each eye where there is no astigmatism, and you will observe that the figure is a rectangle; Fig. 2, shows the same rectangle when seen by astigmatic eyes, while Fig. 3, shows the resultant figure. These points can be demonstrated by the use of cylinders of 3 D. [Dr. Price then gave an explanation of the diagrams.]

DR. H. V. WURDEMANN, Milwaukee, Wis.: Abnormality is but a relative term, and should be used in a relative sense. For instance, astigmatism of 25 D. in one person may be considered abnormal, while 2.00 D. or more in another gives rise to no inconvenience and may be ignored. There are but few persons in whom it is *not* possible to demonstrate some form of heterophoria and this alleged cyclophoria is probably a physiologic phenomena, despite the fact that theoretically, insufficiency of the oblique muscles is quite as probable as those of the recti. I will pass over this and turn to a subject of practical importance, which was considered in the latter portion of Dr. Eaton's paper.

There is no doubt, in my mind, but that the method of treating exophoria proposed by Dr. Gould, is the best of our present known means for developing the strength of the internal recti. Unfortunately, Dr. Gould has referred the condition of exophoria to insufficient innervation. This is a factor, but those of improper insertion of the recti, increased pupillary distances, actual weakening of the muscular tissue, cannot be well ignored. In my hands, after a year's trial, I consider that this "gymnastic exercise" (for it is but that) not only increases the prism-fusing power for distance, but in a less degree does so for near; it lessens or removes the exophoria for distance as well as the near, and actually increases the convergence for the near point, thus increasing the focal angle and all of this without establishing an over-action of the accommodation. With esophoria I have had less experience, but for the more common condition of exophoria I consider that the majority of cases may be cured by the Gould method, in connection with tonic treatment, more satisfactorily than by surgical or any other known means.

Dr. Southard, of San Francisco: It is undisputed that it is indispensable for binocular vision that there should be a clear and well defined image upon the fovea centralis, otherwise the result will be either diplopia or a diffused image. The passage of rays of light through an astigmatic cornea causes an irregular image upon the retina. If the astigmatism is oblique, the proof that rotation takes place in the endeavor to compensate this error lies in this, that between the far point and the near point the axis in astigmatics has been frequently known to change several degrees. A word as to Dr. Gould's treatment of heterophoria by prisms. I have to say that, whether the theory be that of innervation or not, the practical results of such treatment have been found of inestimable value to the patient and physician. I am willing to grant that it may be only a gymnastic exercise of the ocular muscles. It is claimed by some that its only good lies in the power to preserve binocular vision for distant objects. They claim that when we consider the dynamics of the eye, that it has not the same amount of effectiveness. On the contrary, many cases thus treated have given the best results for continuous work at the near point.

Dr. Kaspar Pischl, San Francisco: As it seems to me interesting to hear the experience of those who have tried Dr. Gould's method, I would like to state that I could relieve a number of patients from asthenopia caused by exophoria at the reading range by these gymnastic exercises. In most cases, after a few minutes trial, with prisms, base out, I could find an increase in the adducting power of the recti interni. I hope that the members present will give us their experience on this point.

Dr. H. Bert. Ellis, Los Angeles: Dr. Southard is, no doubt, right when he says that inequality of the recti muscles may be found in nearly every individual, but we may also say that with every individual the amount of inequality varies from time to time. And if we acknowledge inequality in the recti, it seems to me we should not deny the same condition in the obliques. A year ago I corrected astigmatism in a girl, axis 60 degrees, and 120 degrees +0.50 D. Two months ago, clear vision could only be produced with the cylinders at 90 degrees, and it does not seem unreasonable to consider this the result of changes in the oblique muscles.

Dr. Eaton, in closing: In attacking the theories of Dr. Savage, I have in view the objectionable influence upon the therapeutic practice of those who accept his theories. I cannot see that the arguments of Dr. Price disprove the demonstrated facts I have submitted. The attempt to asperse the evidence of Le Conte and Hering as being the result of strictly scientific experiment, unrelated to pathologic conditions, is not justified, since no more patient and thorough investigations could be made. Hering has anticipated every phenomenon of oculomuscular action that has been mentioned to-day, especially as regards the transition from one secondary position to another. I must again assert that it is impossible to find a human being who has not, according to the tests of Dr. Savage, insufficiency of the oblique muscles, provided the person examined, can analyze his visual impressions, which patience will enable him to do. Dr. Price remarked that when a cylinder is held before the eye with its axis vertical, there is no muscular disturbance and no distortion of the object. Yet any one regarding a square card with a plus or minus cylinder held with axis vertical before one eye, will see that while the sides are parallel, the top and bottom appear inclined. Dr. Southard remarks that a clear image must be seen by each eye; that is, undistorted; yet Dr. Friedenwald has shown that if we place in a stereoscope a representation of the image of an object, as seen by each eye, with a cylinder axis oblique, they appear as if fused into an object having solidity; which proves that distorted images are tolerated, and produce no confusion.

Dr. Price gave no data by which we can distinguish the asthenopia produced by astigmatic refraction and the alleged asthenopia of insufficiency of the obliques; nor does he explain the existence of metamorphopsia of individuals who are not astigmatic. No one, in discussing the question of compensatory rotation, in cases of oblique astigmatism, has harmonized the fusion of the horizontal lines with the exaggerated incoincidence of its perpendicular lines, produced by the supposed rotation. In regard to Dr. Wurdemann's statements concerning Dr. Gould's method, I quite agree with him, but would again call attention to my experiences as regards the possibility of producing esophoria for distance, while the dynamic convergence power for the near point remains deficient.

(This report will be continued in next issue.)

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY OF THE BRITISH MEDICAL ASSOCIATION.

(Continued from page 120 of the current volume.)

Dr. Risley, in discussing the papers of Mr. Snell and Dr. Johnson, said that he believed that it was the heat and not the light that caused the eye troubles of puddlers, fireman and stokers. He stated that he had investigated a number of cases a few years ago and invariably found that the choroidal changes were worse in the eye that was always toward the mouth of the furnace. He gave the history of a cook, who had been in his employment, who could not bear the heat of the kitchen because of eye symtoms. In reference to a remark made by Mr. Doyne touching myopia in school life he said that he believed that too much stress had been laid on school life as the cause of myopia.

Dr. Ernest Clarke thought the paper by Mr. Snell was very important. He expressed himself strongly in favor of compelling employers, by law, not only to provide means of protecting the eyes of their employees, but see to it that these means are used. He was anxious that a resolution to that effect should be passed by the Section. But finally the question was deferred to a later period, all agreeing, however, that the eyes of employees, engaged in the avocations mentioned in Mr. Snell's paper, should be protected.

DR. J. L. THOMPSON, of Indianapolis, stated that one of his cataract cases had greatly injured his vision by looking, only momentarily, at the sun through his cataract lenses.

DR. JOHNSON TAYLOR said that too strong light injured both the retina and the nerve. He opposed the use of colored glasses for the protection of eyes not diseased.

MR. G. L. JOHNSON stated that blue glasses would not injure the eyes; that the colors which would work injury were those to be found at the two extremes of the spectrum, the violet and the red.

MR. RAY said that in all schools the eyes of children should be investigated, and that on a blackboard provided for the purpose, there should be parallel columns showing what occupations should be followed, and what avoided, the one column showing occupations to be avoided by the hyperopes, and the other, the occupations that should be avoided by the myopes, and *vice versa.* He condemned the use of colored glasses for the protection of the eyes, stating that they only make the symptoms worse. As to the removal of foreign bodies, he uses either a roll of cotton on a tooth-pick, or a sharp pointed knife.

MR. F. R. CROSS, President of the Section, briefly reviewed, not only the papers, but the discussions that had followed. He dwelt especially on the importance of examining the vision of school children, and urged that Priestly Smith's suggestions that all children with vision only of 6-18, or less, should be examined by an oculist. He agreed with some of the speakers that bad light, necessitating the holding of the book too close to the eyes, might develop or increase myopia. For this reason all schools should be well lighted. He thought that most oculists were agreed that light, and not heat, was the factor most dangerous to vision.

Mr. Snell, in closing, said that incipient cataract should not prevent the use of the eyes. He believed that a fair state of vision would last longer if the eyes were used in moderation. As to the removal of foreign bodies, he stated that the brush or the cotton was sufficient if the foreign body was loose in the eye: but if imbeded in the substance of the conjunctiva, this means would not succeed.

(*This report will be continued in the next issue.*)

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The Oblique Muscles And Oblique Astigmatism.

The editor will be pardoned for making some comments on the discussions brought out by the reading of Dr. Eaton's paper at the meeting of the American Medical Association, at San Francisco, and published on page 144 of this issue, since they are intended to refute what he has written about the oblique muscles. One speaker (see page 147) says: "I quite agree with him [Dr. Eaton], that the rotary displacement of the image caused by oblique astigmatism is entirely insignificant, but *the cylindrical lenses placed before the eyes to correct such astigmatism will cause such rotation of amount sufficient to be of very practical importance, for the images of all lines not parallel or perpendicular to the direction of the cylinder axis.*"

The italics in the above quotation are ours. By his own words, though not so intended, he confirms all that we have taught as to the function of the oblique muscles in oblique astigmatism. In the first place he says, that "the images of all lines not parallel with, or perpendicular to, the cylinder axis are distorted." Every one knows that the effect of a correcting cylinder is to make the refraction of the eye to which it is applied the same as if it were an emmetropic eye, in which there can be no distortion of any image. It is clear then that the rotation of "*very practical importance*," caused by the correcting cylinders, must be equal in extent, but opposite in direction, to the "*insignificant*" displacement of the image caused by the astigmatism. "*Insignificant*" must mean almost none; "*very important*" must mean a great deal; the reasonable deduction must then be that, in correcting oblique astigmatism, we cause great displacement of images that were but little displaced by the error itself. All oculists know that there is no metamorphopsia immediate or remote following the correction of astigmatism (equal in quantity), with the meridians of greatest curvature parallel, whether vertical or oblique. The reason is clear; the images in the two eyes have been distorted in the same direction, and to the same extent, and therefore, have fallen on corresponding retinal parts. In such cases there has been no need for the "complicated action" of either the superior or inferior obliques; and the two eyes together see the object distorted as it is seen by each eye separately. By such eyes a rectangle is seen as a parallelogram, leaning down and to the right, if the meridians of greatest curvature are at 45° in each eye; leaning down and to the left, if at 135°. The correcting cylinders properly placed correct the distortion, and the eyes separately and together, at once and forever, see the rectangle as emmetropic eyes see it.

This is not true of astigmatism in which the meridians of greatest curvature diverge or converge above. The "*insignificant*" rotary displacement in such cases is in opposite directions, and therefore, cannot fall on corresponding retinal parts. If the meridians of greatest curvature diverge above, the right eye sees a rectangle as a parallelogram leaning down and to the left, while the left eye sees the same figure leaning down and to the right. The two eyes together, having a greater disposition to fuse horizontal than vertical lines, are rotated by the superior oblique muscles with the result that the rectangle is seen as a trapezoid with the longer side above. During all waking hours the superior obliques of these eyes are forced to the performance of their complicated function, in order to fuse as nearly as possible the dissimilar images. The correcting cylinder for the right eye makes it see the rectangle as a rectangle, because of its displacement power of "*practical* importance;" and the same is true of the left eye when it is corrected. In binocular vision, through these lenses, however, the rectangle will appear to be a trapezoid with the longer side below. This new distortion is confusing to the patient because it is the opposite to that to which he has always been accustomed. This new distortion itself is due to a continuance, from habit, of the performance of their complicated function by the superior obliques, causing a loss of coincidence of the cylinder axes and the meridians of greatest curvature. The effect is to have the axis of each cylinder in the "arc of distortion" for the inferior oblique; and the new distortion will continue until the inferior obliques respond. In most cases of this kind the metamorphopsia lasts but a short while—from a few minutes to a few hours—for the superior obliques readily agree to the transference of work from them to the inferior obliques, and the latter are usually strong enough to willingly take up the load that the lenses have transferred to them. Before the correction was given, the superior obliques had to converge the naturally vertical meridians to *partly* harmonize images; after the correction, the inferior oblique's must give parallelism to the naturally vertical meridians in order to *perfectly* harmonize images. Such cases, as a rule, take their correction readily and joyously.

When the meridians of greatest curvature converge above, every phenomenon above mentioned is reversed. The metamorphopsia in these cases is not only annoying, being the opposite to what these eyes have always been accustomed, but it is likely to be prolonged; for the superior obliques, which are too strong in only one-half of one per cent. of all our cases, do not take on themselves quickly and kindly the work which the lenses would transfer from the inferior obliques. Some of these cases, the superior obliques being naturally too weak, can never become accustomed to the correcting cylinders, when the old rules of practice are followed. The speaker, from whom we have quoted, said: "This rotation is the cause of very serious inconvenience in the first wearing of cylindrical lenses; and this inconvenience may prevent the wearing of correcting cylinders by persons whose astigmatism has remained uncorrected until after fifty years of age. While in all cases it is the cause of inconvenience, in young persons this inconvenience always passes away in the course of two or three months at furthest." Careful observation, by whomsoever made, will confirm this statement: both old and young usually become quickly accustomed to their astigmatic correction when the meridians of greatest curvation diverge above; metamorphopsia and pain are likely to annoy our astigmatic patients, old and young, for a few days, often for a few months, after beginning the wearing of the correcting cylinders, when the most curved meridians converge above. Some of them, young as well as old, may be forced to discard the cylinders unless otherwise treated. We believe it possible to make all astigmatics wear their correcting cylinders comfortably from the beginning; and in a paper presented to the Edinburgh Congress, we have given the rules for bringing about this desirable end.

The author of the paper in closing the discussion (see page 150), spoke first of what he had termed, in his paper, so-called

INSUFFICIENCY OF THE OBLIQUES.

He said: "In attacking the theories of Dr. Savage, I have in view the objectionable influence upon the therapeutic practice of those who accept his theories;" and yet he did not state anything of the nature of this "objectionable influence." Some day he may be kind enough to do so, and we take occasion here to offer him all the space in the RECORD, he may need. Until then, we will state that the "influence" is far from being objectionable either to the patient or practitioner. The evidence of the good accomplished is two-fold: first, all tests show that the insufficiency has disappeared after a few months of exercise; second, and what is the chief aim of all therapeutic means, the symptoms disappear. This statement is based, not on a simple guess, but on the solid fact that we have cured hundreds of cases, who had not gotten relief from other means, which had been tried by others and in our own office.

Again on the same page (see 150), he says :"I must again assert that it is impossible to find a human being who has not, according to the tests of Dr. Savage, insufficiency of the oblique muscles, provided the person examined can analyze his visual impressions, which patience will enable him to do." We are willing to grant that the examinations made by the Doctor gave him results on which he based his sweeping statement; but either his method of examination was wrong (possibly they were made several degrees below the horizontal plane), or else his patients do not correspond to what we have found to be the normal condition. We have examined a few thousand patients for insufficiency of the oblique muscles, always making the examination in the horizontal plane, and with these results: 74½% showed perfect equilibrium, 25% showed insufficiency of the superior obliques, and one-half of one per cent. showed insufficiency of the inferior obliques. Others have found about the same results.

Prof. Herman Von Helmholtz

In the latter part of July, Prof. Helmholtz was stricken with paralysis from which he died on September the 8th, having attained the good old age of seventy-three But few men have accomplished as much in various departments of scientific work as was accomplished by Prof. Helmholtz. Much of the work he did will live as long as the sciences to which he contributed shall have an existence. Ophthalmology received much from his invesitgations. But for him, we might to-day be without the Ophthalmoscope, an instrument which has had much to do with the development of the science of ophthalmology.

His world-wide reputation, based on the success which he attained in life, should be a source of encouragement to every ambitious young man. Born of poor parents, there were but few openings that would lead into the path of great usefulness. One of these was medicine. It was possible that he could not have entered upon the study of medicine except for the fact that the State gave free instruction to him, and all others, who would promise to serve the State after graduation for a period of years. He was but seventeen when he commenced his medical studies. Much of his life was spent in teaching Physiology in different universities, a science to which he was specially devoted.

Helmholtz' mind was of such a scientific mold, it was his pleasure, as well as his good fortune, to withdraw from the practice of medicine. Thus he was enabled to devote all of his time to scientific investigation.

One of the things that the editor of this journal will always treasure, is a letter to him dictated by Prof. Helmholtz on the 15th of July, just a short time before he was stricken with the disease from which he died.

"The Action of the Oblique Muscles in Astigmatism."

The above is the title of a paper by Dr. Harold Wilson, of Detroit, published in the Archives of Ophthalmology No. 3, Vol. 23 (July, 1894). It is a fair criticism of what we had before written on the same subject. He is correct when he says that, if vertical lines only are viewed by eyes having oblique astigmatism, the meridians of greatest curative diverging above, the inferior obliques will be called into action so as to harmonize images. This is also true: The disposition to fuse horizontal lines is greater than the disposition to fuse vertical lines, as is readily shown by looking at a rectangular card. Most objects seen have dimensions. To fuse the images of such objects in oblique astigmatic eyes, the superior obliques are called into action when the meridians of greatest curative diverge; the inferior, when they converge above. In neither case is the fusion complete, nor is it possible for it to be so short of a correction of the astigmatic condition.

In the paper we presented to the Edinburgh Congress, the whole question of oblique astigmatism is made clearer than we have ever been able to make it before. At least a part of this paper will appear in a future issue of the Record.

THE

OPHTHALMIC RECORD.

VOL. IV. NOVEMBER, 1894. No. 5.

ON THE RELATIONS OF SOME OCCUPATIONS TO THE EYESIGHT.[1]

By **SIMEON SNELL, F.R.C.S.Ed., Sheffield, Eng.**
Ophthalmic Surgeon to the General Infirmary.

The subject of the relation of occupations to eyesight is both interesting and important, but it is at the same time a very wide one. It would be quite impossible, in the time at my disposal, to treat the matter at all exhaustively. It was the fact of the largeness of the subject that somewhat deterred me when asked, in the first instance, to bring the matter under the notice of this section. I am compelled, therefore, to confine my remarks to some occupations only, and have selected instances generally in which opportunities have presented themselves to me for making observations as to the work performed and its action as regards the men's sight.

TOXIC AMBLYOPIA.

Several substances are now known to cause amblyopia, and some of these do so by acting injuriously on those engaged in employments in which they are used.

BI-SULPHIDE OF CARBON.

The effect of bi-sulphide of carbon has been shown by many instances. In 1885, the subject received full consideration at the hands of a committee of the Ophthalmological Society.[1] The employment, in which those suffering have been mostly observed, has been that of rubber making. The bi-sulphide is a very active and penetrating solvent and it is used as a means to dissolve, and carry into the rubber, chloride of sulphur which is the vulcanizing agent. This process is called "curing," and it is during it that the fumes of the bi-sulphide are given off and act injuriously on the general system in those exposed to them, as well as in some cases by causing amblyopia. Recently, I had an opportunity of visiting rubber works in which about 200 hands were employed. I then saw the process of "curing." The rubber cloth, which it was wished to vulcanize, was brought into contact with the wet surface of a wood or slate roller which revolved in a trough in which was the bi-sulphide holding the sulphur in solution. The shed in which the "curing" was done was a very open one, and was well calculated to allow of the ready escape of the fumes. I was told, however, that the vapour was a heavy one and tended very much to keep low, especially in wet or damp weather. Any apparatus to carry off the fumes, therefore, should be one to draw them downwards. I saw several men who had worked with the bi-sulphide for varying periods: ten, seven years, and down to months. One man had undoubtedly two years ago suffered from amblyopia, which appeared to have been characteristic. He changed his work to another part of the factory and recovered. A considerable alteration has, I am told, been brought about in the vulcanizing process. Since the time when the Committee of the Ophthalmological Society reported, the bi-sulphide has been very materially less employed in rubber works. The sulphur is now mixed with the rubber and the vulcanizing is done by subjecting the otherwise finished article to a high temperature. The bi-sulphide in the future is even less likely to be required and, therefore, in this class of occupation at all events, we may expect that amblyopia will be more infrequent.

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[1] A paper read at the Annual Meeting of the British Medical Association, Bristol August, 1894.

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[1] *Transactions of the Ophthalmological Society.*

DINITRO-BENZOL.

My observations on the effects of dinitro-benzol[1] on the health, and especially upon the eye-sight of those working with it, have only recently been put on record, and the briefest notice will therefore now suffice. The occupation in which the dinitro finds use is in the making of explosives. Those affected were chiefly engaged in "mixing" or "grinding" the material; they suffered often severely from general symptoms of a most alarming character; the cartridge "fillers," and to a less extent the "dippers," suffered likewise. The investigation was undertaken in consequence of a patient engaged in the making of this explosive substance seeking advice for defective sight with the characters of Toxic Amblyopia, and, altogether, I found five cases of this nature. The symptoms generally had much in common with those of poisoning with bi-sulphide of carbon. I have before dwelt upon the means which are advisable to avoid the deleterious action of the dinitro, and, like the other members of the Toxic Amblyopia group, removal of the cause is desirable, and the treatment is the same.

TOBACCO.

Tobacco, which was the first agent to be recognised as causing Toxic Amblyopia, and which has since been such a fruitful source of this kind of optic nerve failure, can hardly be classed with occupation disorders. Galezowski ("Des Amblyopias et Amauroses Toxique," 1879, p. 47), however, asserted that visual troubles occurred in those engaged in the manufacture of tobacco in consequence of the absorption of nicotine powder. He further advised that the working places should be well ventilated, and recommended a change of occupation for those affected. I cannot recall any corroboration of this statement by other observers.[1] There is, however, plenty of evidence opposed to it. Mr. Shears (*British Medical Journal*, 1884, vol. i., p. 202) relates that he visited the large factory of Cope Brothers, where 1,200 men and women were employed, and that he made careful enquiries in each of the departments of the foremen, but from none could he learn of instances of sight failure. Mr. C. Lee at the same time made observations at a large factory at Chester, with similar results. I do not think my experience of great value, but just mention it. Sheffield is celebrated for its snuff, the two kinds, Top Mill and Bottom Mill, being well known. There are also several smaller tobacco works about the city, but my attention has in the last twenty years, never once, I believe, been directed to a case of tobacco amblyopia in a worker at any of these places. Recently, in America, Dowling has gone into this matter (*Cincinnati Lancet-Clinic*, October 29, 1892, "Influence of Tobacco on Vision; some Investigations made in Tobacco manufactories of Cincinnati"). There were 3,000 employed altogether at the manufactories he mentions, half being females. Ninety per cent. of the males used tobacco in some form or other, and twenty per cent. chewed, in addition to smoking, liberally, pipe or cigar. This is how he gives his conclusions: "When I commenced my examination I was under the impression that the constant inhalation of the dust and the odour of tobacco in the workshop would tend, of itself, to bring about symptoms of tobacco amblyopia. I am induced to think this hardly takes place, for in my examination I found those who did not smoke were uniformly free from troubles of vision of a toxic nature, and the females were almost universally free from the trouble, that is as far as I examined them." It should be stated that he examined of the total, 5 per cent., or 150.

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[1] *British Medical Journal, March 3, 1894.*

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[1] In the discussion on this paper Dr. de Schweinitz, of Philadelphia, U. S. A., related the case of a girl, a non-smoker and non-drinker, whose occupation necessitated her having the arms immersed in tobacco juice, and she became afflicted with typical tobacco amaurosis.

IODOFORM.

Iodoform, by the cases of Priestley Smith and Valude, must be added to the agents causing Toxic Amblyopia. I am not aware of any investigations showing its occurrence in those employed in its manufacture. It is being made, I understand, largely in England as well as on the Continent, and enquiries which have been made for me, state that no cases have been known of eye mischief due to the manufacture of iodoform.

LEAD.

There remains lead to be mentioned. In the variety of occupations in which lead is used, its influence on sight comes under our notice either as causing optic neuritis, directly or indirectly, as a part of encephalopathy, or yet again as retinitis albuminurica, as a consequence of renal disease induced by the lead. The occupations in which all these may be met with are almost legion. Among the file-cutters we meet with cases in Sheffield. The way this occurs is that the file is placed on a lead bed, and each time it is struck with the chisel, sufficient of the lead is raised which, by inhalation or absorption, in time induces the features of lead poisoning in its varied forms. I have met with cases of optic neuritis apart from central disease among these file-cutters, as well as in association with brain mischief. One of the last was in a girl with optic neuritis and palsy of the left abducens, but with no evidence of intra-cranial disease, and in which complete recovery resulted.

INTENSE LIGHT AND EXCESSIVE HEAT.

These two are important features in many occupations. Dr. George Mackay has recently collected into a most interesting series,[1] the cases, which have from time to time been recorded, of blinding of the retina by the direct action of sunlight. He there alludes to a case of mine in a youth, who after looking at the blazing sun with a telescope, suffered from a permanent central scotoma. It has seemed to me that these cases can be perhaps explained by supposing that the dioptric media have acted in a somewhat similar manner that à burning glass does, and in this way the lasting effect is produced in the macula and fovea.

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[1] *Ophthalmic Review*, 1894.

These cases are, however, quite different to what is met with in those exposed in their occupations to intense light, associated in many instances with very high temperatures.

Glass blowers are asserted to be frequently the subject of cataract,[1] and it has been sought to connect this tendency with the powerful heats to which their work exposes them, and also to the sweating which accompanies it. I have seen something of glass blowers from time to time, and my experience, whilst it does not allow me to support this assertion of the frequency of cataract among these men, may be regarded as too limited to contradict the statements which other observers have made. If, however, the two features mentioned—heat and loss of moisture—are to be regarded as sufficient causes for the production of cataract, then it should be found especially, also, among iron and steel workers who, in addition to higher temperatures, are exposed perhaps to as much sweating and to more intense glare than are glass blowers, and I have no evidence of these workers being especially prone to lens lesions.

I propose to consider some of the aspects of heat and bright light, as regards occupations with which I am familiar:

There is first, the brightness of the metal worked upon. Silver, either the metal or electro, when finished, has a very highly reflecting surface. Some years ago a girl, who was under my observation, in passing along the streets had flashed upon her the brilliant sunlight reflected from one of these bright surfaces. She suffered in the eye, which had been caught by the light, from a neuro-retinitis, but made a good recovery. I mention this case merely to indicate the bright reflecting surfaces which some workers have to deal with. To be brought to the proper polish, silver or electro goods pass through various stages, but the most important for our purpose now is the finishing one of "burnishing."[1] This is usually done by girls, who so work on the surface with a blunt tool, that it makes it very bright. These girls are frequently the subjects of hyperæthesia of the retina, by which they are often compelled to relinquish the work entirely. Coloured glasses and correction of refractive errors help in some cases. A similar sort of disorder I saw some years ago in a woman who handled many pounds, each day, of silver coin. Counting it over at night, as each man brought in the amount earned with his cab, was what she found trying to her eyes, and which colored glasses did not relieve.

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[1] Dr. Landolt (Paris), in the discussion, said he had no doubt, from his experience, as to the frequency of cataract in glass blowers.

Excessive heat associated with intensity of light, is met with in iron and steel works in the different processes connected with making of the iron and converting it into steel. There is, I think, no definite evidence that men exposed to the heat and glare of the furnaces, or from the molten metal, suffer in their eye sight. It is a subject about which I have for some time been interested, and friends attached to the large works for which Sheffield is so famous, have afforded me facilities, many times, of witnessing the different processes, and have given me valuable information. The men are, in consequence of the heat, prone to sweat a great deal, and frequently wear little clothing above the waist. The temperatures before which they work are to an outsider something almost astounding, especially if he remembers that the temperature of an ordinary well-lighted fire in a grate is about 500°F. Now, I am told there is a very marked difference in the way a temperature is borne when it is below 2,000°F., and when above it. Up to that figure a man can look at the metal in a furnace with comparative ease, but before it gets to 3,000°F. he is compelled to wear coloured glasses when doing so. My friend, Mr. W. H. Ellis, of the Atlas Works, has kindly given me the following data as to the heat of the metal: "In dealing with cast iron the heat of the metal would be about 1,800° to 2,000°, and the men employed take no precautions. The heat of the molten steel would be about 2,700° to 2,800°, while the heat of the gases in the furnace would be about 200° or 300° more. The furnace men have to wear deep blue glasses to protect their eyes from the glare of the furnace. With this precaution we have not observed their eyes to suffer in any marked degree. The heat of Bessemer metal is about 3,000° to 3,200°; in this case there is not the same necessity as in the Siemens, to watch the hot metal, and the men do not wear glasses. We do not observe any ill effects directly traceable to the heat. In the case of the Siemens men, I should say that without protection the eyes would suffer considerably. After looking at a Siemens furnace without glasses, it is several minutes before the eye can see ordinary things again." There is, moreover, a further difference between the two processes, viz:—Bessemer and Siemens. The former has, as just mentioned, the higher temperature, and the more dazzling glare, but the steel is melted and the process completed in about twenty minutes, and it is only necessary for one man to take close observation, and this he does by means of a spectroscope, and is as far as 30ft. from the molten metal. The Siemens process takes ten hours, and during this period the whole of those engaged will, as the door is frequently drawn up, be taking observations to see whether the melting is proceeding properly. This is constant and regular work, and they are obliged to use coloured glasses. They will stand about 10ft. from the furnace.

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[1] Those engaged in the process called "buffing," suffer in a similar manner.

In addition to all this, in these large works are the castings, forgings, rolling of armour plates, and many other things. A huge forging, of perhaps 60 or 80 tons, is drawn out of a furnace with a temperature of from 2,000° to 2,500°, and placed under a powerful hydraulic press of 10,000 tons power, where, with the men all around, it is hammered with as much apparent ease as putty is manipulated in one's fingers.

Enough has been said to illustrate the high temperatures of these furnaces or huge masses of metal. I have been unable to learn of any photometric observations as to the intensity of the light. The glare and dazzling in the Bessemer and Siemens processes must be seen to be realized. Generally speaking, in fact almost always, it would seem as if the men engaged in these various kinds of work could submit to exposure to the high temperatures and intense lights with impunity, if they will only use coloured glasses when employed with the higher temperatures and the more dazzlingly bright lights. Occasionally one meets with men who appear incapable of continuing to bear these conditions. They feel their eyes to be painful, and it is some time after cessation of labour before the discomfort passes away. Such as these have sometimes to seek another occupation. On the other hand, the readiness with which—it may be after an accident to one eye— men will return to their employment before the furnace or fire, has often astonished me. I could not tell of any particular lesions to which my experience tells that workers such as these are liable. They appear to go on year after year, and certainly—interested, as for long I have been in occupation sight-affections—I have as yet failed to discover any deep or superficial eye lesion that I can associate in steel and iron workers as a result of exposure to intense light and excessive heat. Some years ago, a gentleman, a steel melter, told me that after looking into a furnace he suffered from severe attacks resembling migraine. He was a neurotic subject, and often had headaches, but those caused by the bright light and heat, one or both, were much more severe and of longer duration than those from any other apparent cause. It compelled him to leave this part of his business entirely alone.

ELECTRIC LIGHT.

The many and increasing ways in which the electric light is being used, renders it, in consequence of the injury it inflicts upon sight, important to consider with regard to occupation disorders. Rockcliffe, Emrys Jones, and Little, several years ago pointed out the serious effects on the eyes of those exposed to the glare of this powerful light; and since then many of us have observed instances. In the recent number of Knapp's "Archives of Ophthalmology,"[1] two cases are reported by Brose of men affected by the flash of the electric light. Both were employed on an electric street railway. One man thrust a blade of a screw driver into a motor cylinder and "immediately he was flashed by the powerful light and stunned by the powerful current." When seen five hours after, the eyelids were closed and he was suffering intense pain, but he was able to resume his work next day. The second man struck a "live electrical circuit" with a steel file, and instantly there was a flash of light and he was rendered unconscious. The eyelashes were singed and the arms burnt, and there was great eye pain. It was not until the fifth day that he could return to work. But a much more severe case is reported in the same journal by Rivers. The man was engaged on the Denver Tramway Company as engineer, in the power house of the electric car line. He was using a wrench to some machinery, when accidentally his elbow came into contact with another machine forming a short circuit. The whole electrical force—1,000 amperes—used to propel the cars several miles, passed down the forearm and out at the elbow. The electrical discharge was accompanied by a loud report and an intense flash of light. He was knocked down, but only lost consciousness for a few seconds. Rivers saw him an hour after the accident, when the skin of arm, hand, face and neck, in fact, all exposed parts, was burnt; effects like those caused by boiling water,—eyelashes and eyebrows burnt off. The ocular conjunctiva looked as if a strong solution of nitrate of silver had been applied, and the corneæ were both ground-glass looking, especially in the centres; so much so that the impression was given that they were both destroyed. It was found, however, that only the epithelial layers were affected and ultimately sight recovered, but photophobia remained for some time. Of the many ways that the electric light is liable to be injurious to those employed with it, may be mentioned that of electric welding. This process is one that is becoming very largely used in iron works, and the effects it produces are so rapidly brought about that it must, in the near future, find still further employment. Mr. Hewetson last year, in the *British Medical Journal*, directed attention to a series of cases he had met with in some gentlemen, three in number, who had suffered from the influence of the electric light upon their eyes from having witnessed this process. I have met with men who have suffered also from exposure to the intense light emitted in electric welding. My inquiries at works where the process is used has shown me also that many are to be found who have been affected by it more or less. On two occasions I have had the opportunity of witnessing the process. In last year's "Medical Annual" I detailed observations I had made, and need only now refer to them briefly. The heat produced is so intense that metal runs at once like solder. So rapidly, indeed, is this effected that without seeing the process it seems incredible. The onlookers in the place with which I am best acquainted use large shields. Glass is in the centre, consisting of alternate layers of blue and red, there being four thicknesses. This is set in a large frame of tin and measures 18 inches by 16 inches—the glass being 8 by 6. I am persuaded that the size of this frame is a matter of importance. From what has reached me as to other works were smaller screens, 9 inches by 9 inches, are used, the men suffer much more than in those which I especially mention. The man engaged in working the process has a helmet protecting his head and face This has a window in the middle consisting of glass, six layers alternately red and blue. Any parts of the body which are exposed get burnt, and many men suffer in this way much more severely than if for a day they had been exposed to a burning sun. If the eyes get exposed to the light they feel it at once, but the worst feeling generally does not come on until some hours afterwards, and most men will say that it reaches its acutest stage during the night succeeding the exposure. The eyes feel swollen and as if filled with burning sand. The pain is very severe, or, as one man called it, "very cruel." There is swelling of lids; so much so that they cannot be opened, and there is lachrymation. All night the pain will last, but the next day the worst will be over, and often by a day more the eyes will be all right in all respects. Terrier and Malakoff have each published very interesting observations, as has also Wildnark. The latter especially appears to have settled the point as to whether in these cases of electric ophthalmia it was the heat or chemical rays that acted so hurtfully. Taking advantage of the different actions of glass and crystal, the former absorbing chemical rays, the latter, or crystal, allowing them to pass, he showed that if a pencil of light before reaching the skin was made to pass through a disc of glass, in the centre of which was a hole filled with a small disc of crystal, the redness of the skin was observed only in the central area, a proof of its dependence on the chemical rays. Malakoff pointed that though the light was so intensely dazzling the thermometer was raised only 2° at a metre distant, but it must be borne in mind, however, as a workman mentioned to me recently, that the metal acted upon for welding the portion to—for instance, an armour plate—becomes very hot, and standing near it is hardly possible.

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[1] March, June, 1894.

Mr. Scott Anderson, a well known electrical engineer, tells me he thinks the screen used by the men should be made of dark ruby non-actinic glass. He is satisfied that it is the chemical rays that are injurious. He has written me the following interesting note:—"The 'arc' is very rich in blue rays, and these are the rays which do the damage to one's eyes— at least, such is my opinion—therefore the screens should be such as will cut off all the blue; if we use blue glass, then logically we admit blue rays, and this should be avoided. The eye inflammation is caused, as you say, by the chemical effect and not 'heat.' The luminosity of the 'arc' used for welding will be about 8,000 candles, but as far as I am aware there has been no photometric test; but from my knowledge of arc measurements I should assume 8,000 candles. As to the heat, I can give you something more definite: the current used at Messrs. Cammell's for welding would measure 3,000° C. (about 7,000° F)., and with this current I have fused the most refractory ores, such as chromium. It is not an unusual thing to measure 3,000 C. in an electric furnace.

"The thickest ruby (four pieces thick) will transmit a few chemical rays, and I have repeatedly had bad eyes by simply using the screens. I never, unless by accident, get a glance from the naked eye. The description of the pain is quite accurate."

The action of the electric light upon the eye appears confined chiefly, if not entirely, to the conjunctival or corneal surfaces. Fuchs,[1] however, mentions the case of a boy who got a central scotoma from looking at an electric sun placed in the roof, like those resulting from the action of direct sunlight.

I have seen enough of this disorder occasioned by the electric light, to know that it is a distinctly preventable one, and that with the prudent use of the protectors mentioned, the light can be observed with little risk of injury. I have mentioned the thicknesses of the glasses, and though with these the light in electric welding appears quite faint if afterwards with the same glasses one looks into a puddling furnace with a temperature of between 2,000° and 2,500,° the latter appears as a dim and little perceptible light.

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[1] "Causes and Prevention of Blindness," p. 194.

EYE ACCIDENTS.

The subject of eye accidents as occasioned by occupations, is a large and very important one. I can treat only some of its aspects very summarily here. In several of the Sheffield trades the *employes* are liable to get little particles embedded in the cornea. So frequently is this the case that at the different works and factories men are recognised by their fellows for their skill in removing these foreign bodies.

The grinders are specially prone to these minor accidents. Frequently they get several, even in the course of a day. It is a common sight in Sheffield streets to witness the removal of these foreign bodies. A man will be seen with his head pressed against a wall while another stands in front with a pin or a blunted lancet, trying to get a "mote" from his mate's cornea. The operator is often very expert, but occasionally one meets with instances where the original injury has been made worse. If the cornea of a grinder be examined with focal illumination, it will frequently be found to be studded with little scars. So, that, though each of the injuries has been insignificant, by frequent repetition vision has often become deteriorated. The particles embedded may be from the stone, the steel blade or emery, of which some wheels are made for glazing the cutlery. The dry grinder is more exposed to these "motes" than the wet grinder. A grinder at his work sits across his bench or "horse," as he calls it, and presses the blade against the stone. The wet seems in great measure to prevent the particles from flying, yet still a man's face becomes spattered; but he comparatively seldom gets "motes" into his eyes. With the dry grinding the sparks fly freely, and it is only mere chance whether the particles of metal or stone strike the eyes or face, or scatter about the room. The fans, which are compulsory for dry grinding, exert great influence in drawing away the particles. Some time ago I spent a good deal of time in investigating the processes spoken of, with a view to arriving at methods to avoid the occurrence of the frequently recurring eye injuries. It was clear that they were in great measure preventable if the grinder would only wear protecting glasses at his work. Large spectacles of plain glass are made for the purpose, but the workman is careless and indifferent. The wet grinder would complain that the glasses would get covered at his work, and so act as a hindrance to proper sight. Men who for various reasons have required spectacles, have, however, assured me that they are a great protection. The distance a man is from the stone is a matter of considerable importance, as the further away he is the less becomes the chance of his being struck, and therefore it is of moment to have refraction errors corrected. Besides the plain glass spectacles already mentioned, others are made of mica or talc, or either of these, or glass, with gauze sides.

It is interesting to note that foreign bodies strike the eye in the great majority of cases at its middle or above it: very few below. Thus, of fifty-eight mostly serious injuries with steel chippings, forty-two hit the eye at its middle or above, only seven below, and the situation in nine was not mentioned in the reports. It would appear that some sort of shade could be devised, perhaps of mica, which would be of some preventive value in not only these minor accidents, but in the more serious ones to be presently related. Fuchs has suggested that the use of spectacles should, among workmen, be made compulsory; and Magnus is of opinion that one-eyed men should not be employed in occupations dangerous to eyesight.

Ivory cutting[1] is another industry largely carried on in Sheffield. The circular saw is used and freely scatters about splinters which are liable to become embedded in the cornea. A simple preventive plan I saw at some works a few years ago, was the suspension of a small screen, made in this instance of simple brown paper, over the saw. This effectively prevented the return of the particles towards the workmen.

The more serious injuries happen to the workers in metals. Those engaged in chipping, punching, chiselling, rivetting, fitting, and the various other works, both in steel and iron, suffer from accidents less frequently, perhaps, than the grinder, but of a more serious nature. In punching or rivetting, as in other work no doubt, it must be recollected that there are no less than four surfaces from which a fragment may fly off—the head of the hammer, the two ends of the punch, and the steel itself. These splinters coming off with great velocity penetrate often an eyelid and lodge in the interior of the globe, or are found sticking in the cornea, sclerotic, anterior chamber, or lens. It may be stated, as showing how these injuries bear upon occupations, that of the large number about 150 fragments, that I have removed with the electro-magnet from different parts of the eye, not one has been in a female.

The remarks made before, as to protective measures, apply with greater force to this heavier kind of work than it did to grinding.

Another class of serious accidents are those from molten metal. In some instances it has been slag that has done the damage, or hot coal, coke, or cinder. The destruction of cornea, sometimes complete, with sacrifice of eyeball, or, in other cases, with more or less extensive resulting symblepharon, bring these accidents among the very serious cases. It has been suggested that the workman's face should be protected with a fine network.

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[1] Stone-cutters also are liable to get particles embedded in the cornea. The chipping of stones in the streets without the protection of a hoarding, is fraught with danger to passers by.

Colliers are also exposed to eye injuries. From figures supplied to me by Mr. Watson, Secretary of the West Riding Permanent Relief Fund Friendly Society, I find out of a total of 34,795 non-fatal accidents, no less than 1,778 were to the eye. The parts of the body in excess, as far as numbers go, being hands, 9,951; legs, 4,595; feet, 5,048; back, 4,816; arms and body were a little in excess of the numbers given for eye injuries. This gives to eye accidents a large proportion. They are mostly, I think, abrasions of the cornea, caused generally by pieces of coal, but sometimes by particles from the pick or wedge used for getting the coal down. There is a greater tendency, I think, for these, than is the case usually with abrasions, to run into hypopyon ulcers.

In my experience the loss of an eye as a consequence of a man's occupation is, comparatively speaking, so frequent, that I should like to see a system of insurance against accident more fully adopted by workmen. The Employers' Liability Act only covers cases which have arisen through any carelessness on the part of the employer. The cases I allude to do not come under this class at all, and are, generally speaking, accidents pure and simple. Many of the workmen's clubs provide, by the payment of a stated sum, in some cases £100 ($500.00), to a member who has been permanently incapacitated from following his usual employment. This, of course, does not meet every case in which one eye has been seriously damaged, or even altogether lost. Insurance should cover the loss of an eye whether the man pursued his occupation again or not.

[For the discussions elicited by this paper see pages, 120, 151, 152 and 153, current volume. This report of Section G., of the British Medical Association, will be continued in our next.—Ed.]

MYOPIA: ITS TREATMENT BY SYSTEMATIC DEVELOPMENT OF THE CILIARY MUSCLE.

By N. T. DULANEY, Jr., M. D., Bristol, Tenn.

In this age of muscle cutting and the study of muscular insufficiencies, errors of refraction have been somewhat lost sight of. Various conditions of hypermetropia have been discovered and corrected, and some have been discovered and corrected by our enterprising jewler-opticians, that never existed, or at least, never needed correction. Myopia, while not so common as hypermetropia, but far more serious in its results, demands our most earnest consideration. It is commonly called nearsight. It is not often, if ever, hereditary, but there exists a predisposition or weakness of some part of the external tunic of the eye, and through the habit of bending over when reading, and reading in badly lighted rooms, the objects looked at are brought too close to the eye: and this, with lack of power for proper ciliary contraction, causes too great strain upon the eye. I believe there is lack of ciliary power in these eyes just as there is a congenital weakness of some part of the sclerotic; or just as there may be a difference of ciliary power in hypermetropic or normal eyes. I firmly believe there are cases of acquired weakness of the ciliary muscle which cannot stand the strain when the eyes are used for close work, and as the muscle becomes weaker, the eye begins to elongate, and the ciliary muscle, from lack of use, causes the ciliary body to lose its nourishment; and as the lens receives its nourishment by osmosis from the ciliary body, it also loses a certain amount of nutrition when there is a lack of proper ciliary exercise.

The myopic eye is too long in its antero-posterior diameter, and parallel or convergent rays of light are focused in front of the retina. The myope then, in order to have sharper vision, must render the rays of light divergent; this he does by bringing objects close to the eye, which causes unnecessary strain upon the internal recti. When the ciliary muscle contracts, there is a corresponding *tendency* on the part of the interni to contract. So, when the ciliary contracts less in myopia, and in myopia over 3 D. not at all, there must necessarily be a weakness of contraction of the interni, which insufficiency may lead to periodical or permanent squint.

I believe this increased strain upon the interni, together with lack of ciliary contraction, is the cause of progressive myopia. I do not think that myopia is in every case a disease. There are cases of myopia due to disease of the external tunic of the eye, and there are cases started by continued application to near work, and kept up by too great contraction of the interni, together with lack of ciliary power and contraction.

Oculists have been correcting myopia with a weak glass for near work, and a stronger one for distance; and have been satisfied to find in a few years that the myopia is still progressive. While the progressive spirit is a good one, this progress is a decided evil. Dr. S. M. Payne, of the New York Polyclinic, in report of quite a number of cases, where he gave the stronger glass for near work as well as for distance, says that he was gratified to find that in after years these cases had not progressed; that the myopia had remained the same. Without reflecting upon any of you who may be myopic, I must say that the myope is not very accommodating. With this thought in view I believe that myopia can be checked by development of the ciliary muscle. This is my own theory. This should be done according to the following:

Say we have a case of myopia equal to 8. D. I would give full correction for distance and 5.50 D. for near work, which at thirteen inches would give a contraction of the ciliary muscle equal to .50 D. After this has been used for awhile, the strength of this glass for near work should be increased to 6 D., 6.50 D. etc., increasing the strength of the lens until the ciliary muscle can contract equal to 3 D., and then we can use the full correction 8 D. for near work, thereby establishing the proper amount of ciliary contraction, and restoring more nearly the relationship existing between accommodation and convergence. I believe that ciliary contraction is necessary to maintain the integrity of the eye until the tissues have become hardened by age.

The effect of concave glasses is to render the rays of light divergent, make the image somewhat smaller and remove the far point, thereby lessening the amount of internal recti contraction, and increasing the degree of ciliary contraction.

When there is a difference in the two eyes I think we should correct the whole amount in each eye. Most authors object to this, saying, there will be a difference in size in the two objects. There is already a difference in the size of the two objects, as seen by the two eyes. The eye that has the greater degree of myopia has the larger image, and as concave glasses make the image somewhat smaller, the image in the eye that is highly myopic is made somewhat smaller than it was before. When there is anisometropia not corrected, the patient will view near objects with only one eye, and the other eye will drift around out of the way, and we will have divergent squint more or less marked. Myopic patients complain of dimness of distant vision, while for near work vision is better, and we have pain in the eyes and headache, because of the difference in size of the two images, and the strain upon the internal recti. When we correct the amount in each eye, we bring the images down to the same size. Consequently, I have formulated this rule: The image is to the object as the angle of convergence is to the angle of divergence. By the angle of convergence I mean the angle formed by the rays of light as they are focused within the eye; and by the angle of divergence I mean the angle formed by the rays of light that are rendered divergent by concave lens placed before the eyes.

I believe that some cases of myopia are mistaken for hypermetropia with spasm of accommodation. Not long ago, a young man presented himself for examination. I found that without a mydriatic he had simple myopic astigmatism of .50 D. axis. 180. With homatropine he had simple hypermetropic astigmatism of .75 D. axis. 90. I thought it a case of simple myopic astigmatism and so prescribed. I do not know the cause of this, unless it is this: The horizontal meridian which was normal, showed the need of a plus glass when under the influence of a mydriatic, in order to overcome the slight divergence of the rays of light as they come from a distance of twenty feet. And the other meridian which was myopic (and suited to the slightly divergent rays), appeared normal when the mydriatic was used. Dr. Chisolm mentions several cases of this kind, but gives no explanation.

In conclusion I will say that more than six thousand years ago, the great command was given, "Let there be light, and there was light," and the same law governed this light then as now, though it has not always been understood. The stars that form the milky way twinkled in obedience to the same law ages ago as they do to-day. The Sun himself, they say, grows dim with years; yet the same law governs his shining as when the great solar system was first put into being. The star of Bethlehem that pointed the wise men to the dawn of the Christian era gave forth its light in obedience to this same grand law. But ophthalmic art was then unheard of, and ophthalmic science had never been known. One by one these new sciences have been discovered, and to-day the ophthalmic surgeon says to the man blind from cataract, "let there be light," and with one stroke of the knife there is light. He says to the patient with a high degree of myopia, "I will construct a lens that will open to you a new world, or reveal the old one again, so that you may see the landscape with its broad fields of waving grain, its mountains that lift their heads towards heaven and the clouds that sleep upon their summits, and the rivers that flow in majesty toward the sea"—and yet ophthalmic science has just been born.

CYCLOPHORIA, ITS DETECTION AND TREATMENT.

By Geo. H. PRICE, M.D., Nashville, Tenn.

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Cyclophoria or the rotary tendency of the eye upon its antero-posterior diameter under certain conditions, known also as insufficiency of the oblique muscles, is now a matter of record upon the case books of so many, as to no longer be a question of speculation. When the question of insufficiency of the obliques in certain cases of oblique astigmatism, was first presented and fully elucidated by Dr. Savage, of Nashville, Tenn., there was in the minds of some room for doubt as to the verity of the statement, but I am now ready to believe that this statement is received as a fact, by those who have given the question sufficient thought and have applied to it those tests which we now have at hand for demonstrating this condition.

For a long time only the grosser errors of balance of the obliques were considered of importance, and the methods of arriving at conclusive evidence were of such a character as to render it difficult, if not impossible, to bring out this defect unless well marked or the patient was of that class of observers upon whose statements one can rely with certainty. These difficulties have been overcome, and the means of detecting the condition have been so much simplified that to-day we can not only detect, but determine in degrees, even small variations from the proper adjustment of these muscles.

Cyclophoria is not only found in oblique astigmatism, where we would naturally expect it, but is also present in many cases where there is no obliquity of the astigmatic condition and also in cases in which there is no astigmatism at all; so we must conclude that it is not only a complication in some, but in all forms of focal error, to such an extent as to cause it to be looked upon as an important factor, which requires us to exert ourselves in detecting it and applying the necessary treatment. I have compiled a table of two hundred cases from our case books, showing the various forms of focal error and the muscle conditions complicating each, as well as the percentage in the whole, of each muscular variation. This condition as a causative factor in the symptoms of eye-strain is of prime importance, for if neglected, though all other conditions have received proper consideration and have been eliminated from the catalogue of complications, yet there will be complaint from your patient until you have met this feature and applied the proper treatment. Hence it becomes necessary to recognize the cyclophoria and be prepared to give your patient the benefit of treatment which can be successfully carried out.

It is now a well established fact that the tests for exophoria and esophoria must be determined before the use of a mydriatic, since the suspension of accommodation alters these muscular relations to such an extent as to mask the true condition; but in the case of cyclophoria the test can be made before and also after suspension of accommodation, and the result relied upon as trustworthy; however, it is well to note it both before and after use of homatropin or atropia, to be satisfied upon this point.

The causes of cyclophoria, like those of other phorias, are dependent upon a variety of conditions, one or several of which may obtain in the same case.

I will call your attention first to that cause which gave the initial impetus to investigation in this line, viz., oblique astigmatism. In the first place, it is to be noted that if the astigmatism is of such a character that the meridians of greatest curvature diverge above, the superior obliques are kept constantly on a strain in an effort to converge the naturally vertical meridians so that corresponding portions of the retinæ shall receive the same impression. This constant effort induces fatigue or wears out the normal contracting power of the superior obliques and thus induces an insufficient action, relaxation or cyclophoria.

Again as the inferior obliques act in conjunction with the inferior recti, and are augmented in their action by the action of the former, and as the inferior recti are constantly in action during all efforts at near work, an extra amount of duty is hereby imposed upon the superior obliques, which extra work they frequently find impossible to sustain, the failure manifesting itself in cyclophoria. This complementary action of the inferior recti can be easily demonstrated, and has been noted heretofore, hence it is a factor in cyclophoria of that variety involving the superior obliques.

Again a faulty insertion of the external and internal recti will augment one or the other of the obliques in their action, thus becoming a factor in the production of this condition. This condition of variable or faulty attachment has been observed by all who have operated on the tendons of these muscles. If the tendons of these muscles are inserted more below than above the horizontal diameter of the eye, then we find that the internal recti augment the action of the inferior obliques, while the external recti will assist the superior obliques, but as cyclophoria manifests itself principally when the eyes are in a state of convergence, when the internal rectus is stimulated into action and the external is in a state of more or less relaxation, we can readily see that as a result the muscular equilibrium of the obliques is overcome and the superior muscle fails to accomplish the extra duty demanded of it.

If we should have these muscles placed correspondingly above the horizontal plane, then the reverse would obtain.

So also can we find that faulty attachments of the superior and inferior recti may complicate the action of the obliques.

Faulty attachmets of the obliques themselves are to be considered as factors; especially is this probably the case with the superior, since there are two points at which faulty adjustment may creep in, viz., their insertion on the globe of the eye and their physiologic origin, the trochlea. The latter may become elongated from protracted tension, or it may be located too far posteriorly, either of which conditions would result in deficient action. Failure of development of the obliques, or lack of innervation may also be remembered as probable causes of insufficient action. It is, of course, a difficult question to decide as to the immediate complicating causes of each case, but then the probable factors may be held in mind.

A very noticeable fact, in the study of this condition, is the frequency of that form involving the superior obliques and the rarity of that in which the inferior obliques are involved.

From a table of two hundred consecutive cases, taken from our records, before alluded to, I find cyclophoria, insufficiency of superior obliques, in 25 per cent. of all cases (the same percentage has been noted by others) while there is but ½ per cent. of cyclophoria in which the inferior obliques are at fault. There must be a reason for this and I think it can be accounted for in the following way:

The third nerve, known as the motor oculi, presides over the greater portion of the muscular machinery of the eye and is that nerve which is called upon most frequently. In convergence and accommodation there is direct stimulation of all of its fibers except those which supply the superior rectus, hence we see the inferior oblique augmenting the action of the other muscles while the superior rectus, a part of whose duty it is to antagonize the inferior oblique and inferior rectus, is in a state of relaxtion, partial or complete.

Again the superior oblique by its action aids in depressing the cornea, by drawing up the posterior part of the globe, at the same time producing slight abduction, and in this very fact while aiding in a general way, also partially counteracts, its own special function. How is this accomplished? In producing abduction it tends to turn the entire anterior part of the globe outward, but in this it fails, for the lower half is prevented from making this outward excursion by the combined action of the inferior and internal recti and inferior oblique. In this I think we have a sufficient reason, and it seems to be borne out by the additional fact that those who make near use of their eyes are those who suffer most from cyclophoria of this type, though there are exceptions.

Let us now look into the question of detecting the presence of cyclophoria in any given case. After having tested the lateral muscles, before homatropin or atropia has been instilled into the eyes, and these are noted for the near and distance, then with the same double prism in front of one eye, thus producing a double image in that eye, we hold a card (on which we have a well defined red or black line) in front of the patient. The eye in front of which is the double prism will see two lines upon the card while the uncovered eye sees only one line. The card must be held in a plane parallel to the plane passing through centers of rotation or tangent to the corneas, otherwise the two lines seen by the eye, in front of which is the double prism, will not be parallel. Now if there is no defect in the balance of the obliques, then the middle line is parallel to the other two lines, and is half way between them (provided there is no hyperphoria or cataphoria) but if there is insufficiency of either of the obliques then the middle line will dip at one end or the other, according to the condition present.

If the double prism is in front of the right eye, the two images being seen by this eye, and the middle line seen by the left eye is inclined to dip at the right hand end, then we know at once that the superior oblique of this eye is failing to do its duty, thus allowing the perpendicular meridian to rotate outward or the horizontal upward at the inner extremity, while the line is seen to rotate or move in the opposite direction, that is downward at the right end. If this dip is but slight, the eye will adjust itself so quickly to the faulty condition by a demand upon the superior oblique, that the patient may fail to discover the lack of parallelism with certainty. Instruct him to close both eyes gently for a few seconds, this rest causing the muscles to assume their ordinary relations, then when he opens them tell you if the lines are still parallel. This little procedure takes the eyes off their guard, consequently when he opens them if the cyclophoria is present the middle line will be seen slightly dipping, but soon the guiding sensation of the retina calls upon the oblique and after a few slight oscillations it may assume a parallel position, or so nearly so as to render it difficult for some to discover the lack. If there is reason to suspect the presence of cyclophoria, and your patient is not a careful observer, then we have a proof test which can be applied with much satisfaction. To apply this test the frames should be adjusted to the pupillary distance of the patient, then with a cylinder, say +2 D. in front of the eye being tested, (which is the left in this case) having the axis at 90°, which position does not affect the result, turn the cylinder to 100°, when almost immediately the patient will say the line is dipping to the right. If now the cylinder is brought back to 90°, the lack of parallelism is still observed and it will have to be moved to say 80° or 75°, before the middle line will come up to its proper position. In marked cases of this condition the 2 D. cylinder, and in some rare cases, even at 3 D. cylinder must be rotated to 45° before parallelism is established and maintained. In case the inferior oblique is deficient the dipping is reversed; that is, in the left eye the middle line dips to the left; therefore, in case the proof test has to be applied we would have the reverse position of the cylinder in the foregoing. If the condition is suspected and the proof is applied, the cylinder being turned to the right or 100° and then to the left or 80° and the same amount of dip, first to right and then to left is noted, we conclude that there is no cyclophoria.

There is another test of this condition which I have devised and used in a crude form in some cases, which may prove of service. The testing apparatus is a combination of the double prism and the Maddox rod in front of one eye and the rod in front of the other, and is used in conjunction with the candle or gas-jet at twenty feet. The double prism converts the single line of light made by the rod into two lines, which lines are parallel and about 18″ apart, while the rod alone in front of the other eye produces a single line of light, which should be half way between the upper and lower lines (provided there is no hyperphoria or cataphoria) and parallel to them. If cyclophoria is present there is a deviation or dip which will be of the same character as that shown by card test at eighteen inches. This little device I present for your inspection. Though this condition at first was looked upon as one to which no treatment could be applied, yet I am glad to say that through the study and investigation of my friend, Dr. Savage, we are now in possession of a plan, which in our hands, has proven most satisfactory, and to this I will now direct your attention. It will be remembered that in making the test for detecting cyclophoria we made use of a cylinder, by means of which we can increase or lessen the strain upon the oblique muscles. This principle is made use of in the treatment of this condition.

It is a well established practice now to exercise the recti muscles, and this is done by gradually increasing the strain upon the individual muscle by the use of prisms so placed as to call the muscle into action; and the same plan is followed in the case of the obliques, but we must use the cylinder instead of the prism.

If the patient under treatment is suffering with cyclophoria, superior (insufficiency of superior obliques), then with a cylinder of +1.50 D. in the frames, and the patient looking at a light fifteen or twenty feet distant, we begin by turning the cylinder in the right to 75° and that in the left to 105° (thus putting the superior obliques slightly upon the strain) and instruct the patient to raise and lower the frames every four or five seconds. Looking through the cylinders at the light induces slight action or contraction of the obliques and raising the cylinders allows them to relax. This is continued for say five minutes, after which the cylinders are again turned, in the right to 60° and the left to 120° and the patient put through the same exercise as above mentioned, continuing it for three minutes. This causes increased action by reason of the fact that the cylinders in these positions cause greater strain upon the obliques in their efforts to overcome the greater deviation from the normal condition. Finally the cylinder in the right is turned to 45° and in the left to 135°, and the exercise repeated for two minutes. This position of the cylinder causes the maximum strain upon the obliques.

If the cyclophoria is inferior, or insufficiency of the inferior obliques, then we pursue the following method of exercise: With frames on and cylinders in them, we place the cylinder in right at 105° and in the left at 75° and exercise as before directed by raising and lowering the cylinders in front of eyes while patient looks at the distant light. Then move cylinders to 120° in right and to 60° in left, and finally to 135° in right and 45° in the left. This exercise should be taken twice daily for a time, though the amount of exercise may be varied according to the symptoms manifested by the patient; for instance, if the patient complains that the exercise causes pain, then instead of taking the full amount, this can be altered to suit the case, thus allowing him to exercise only one-half or even one-third of the time divided between the three steps, or even allow him to exercise for the full time with the cylinders in the first position, and gradually increasing as the patient will bear it.

It will be well to bear in mind the fact that the symptoms of which the patient has been complaining will in many cases disappear before his cyclophoria does, hence it is well to keep him under the influence of the exercise for some months, resorting to it daily or every other day, or even once a week. This treatment has proven of the greatest benefit to many patients upon whom it has been tried, and I have great confidence in it.

We must keep in mind the fact that cyclophoria is a condition which must influence us in the adjustment of lenses, and especially those in which we find a cylinder needed for the correction of astigmatism. While in cases where the axes of the cylinders are seemingly at 90° in each, when the eyes are tested separately, both with lenses and ophthalmometer, yet we may find that the cyclophoria, say of the superior obliques, may prevent the comfortable use of the glasses if the axes are allowed to remain at these points. More particularly is this the case if you have noted any disposition of the cylinder in the right to go toward 100°, and that of the left toward 80°, which positions would be favorable to the weak superior obliques.

Again, if your ophthalmometer shows in the right the position of the cylinder to be, say 100° with tendency to 105°, and in the left the axes is to be at 80° with tendency to 75°, and the test lenses showing the same tendency on the part of the cylinders, it will be advisable to place the cylinders at 105° in right and 75° in left, thus removing the strain from the obliques, and at the same time correcting the astigmatism. If the axes of the cylinders converge above, from the nature of the case this increases the strain upon the superior obliques, and consequently this must be remembered, and due allowance made for it. In such a case say the cylinder in right by the ophthalmometer should be at 60°, and in left at 120°, that is the axes converging above, and that test lenses confirm this, but that the cylinder in right tends to 65° or 70° and in the left to 115° or 110°, then it would be good practice to favor this by placing the cylinder at 65° in right and 115° in the left, thus decreasing the convergence, thereby removing a part of the strain from the superior obliques. Unless these points are watched discomfort follows, as I have learned by experience. A case or two bearing on these points may be of service:

V. S. P., real estate agent, came complaining of his eyes. He was using lenses which were unsatisfactory. Under homatropin his condition was as follows:

O. D. V. 20-xx w.+.25⊃+.50 cyl. ax. 80°.
O. S. V. 20-xx w.+1.50 cyl. ax. 90°.

Each eye was tested while the other was covered by disc. These lenses were given him and he began to use them. In a short time he found the left eye so painful as to hinder him in his work. This lens was changed and had substituted therefor +50⊃+1.00 cyl. ax. 85°; this position of axis seeming to be preferred at this time. This was much more comfortable, though vision was not good. After a time we put in the +1.50 cyl. ax. 85°; this gave him comfort and good vision at the same time. You see this allowed the axis to converge less above, thus reducing the strain on the superior oblique which relieved the case. We did not fully appreciate the significance of this at the time, but now since we know the part played by the superior obliques in such cases it is apparent. We noted later cyclophoria superior.

Another interesting case is that of Mrs. B. H. R., who consulted us about her eyes; this was about the same time as the above named patient. She was refracted and the following record made:

O. D. V. 20-xx w.+1.00 cyl. ax. 70°.
O. S. V. 20-xx w.+.50⊃+.50 cyl. ax. 110°.

This was given for distance and a+2.00 D. each for reading to be worn in front. This was in 1891, and the patient who resided out of the city, was not seen again until a few weeks ago, when she stated substantially as follows: "Cannot use the distant glasses all the while as they cause pain in eyes, most marked in right (where she had the strong cylinder at 70°, increasing the strain upon superior oblique). Have been more comfortable with a simple+2.25 used for near work." Cyclophoria superior being present, and detected at this time, she was put on exercise for same, and told to use her glasses for distance.

Two weeks later she reported again with some improvement, but not comfort as yet. At this time the cylinders were revolved in the frames, the right to 80° and the left to 100°, exercises continued, and patient to report in two weeks. The two weeks having passed she reported, and her condition was flattering, the annoying symptoms having subsided and she was wearing her distant lenses all the time. The cyclophoria being also reduced by the exercise showing increase in strength of the superior obliques, the lenses were turned about 2° back toward their original position.

The last case to which I will call your attention is that of Mrs. T. M. O., who came complaining of the ordinary symptoms of eye-strain. Under homatropin we found the following condition:

O. D. V. 20-xx w.+.75 cyl. ax. 90°.
O. S. V. 20-xx w.+.50⊃+.75 cyl. ax. 90°.

Four degrees exophoria in near, before use of homatropin. Cyclophoria superior, slight. This correction was given her and she was put on exercise for the exophoria, as this was looked upon as probably the most annoying factor in her case. When she received the lenses and began the use of them they gave her trouble. She applied to an optical company and their refractor gave her a cylinder for the left of +.75, the axis being at 75°. This gave her relief since the position of this cylinder took the strain off the weak superior oblique and put it on the inferior, which was more able to perform extra duty. In this case it would have been better to diverge the axes in both, placing the right at 95° and the left at 85°. It must be remembered that this change in the position of the axes of cylinders where cyclophoria is present should be used only as a temporary means of relieving the symptoms (for it does not remove the cause), until the insufficient obliques can be brought up to normal activity by the proper exercise. Hence the lenses may be turned in the frames to induce comfort, while the exercise of the obliques is resorted to, and as the obliques recover full power the lenses can be gradually revolved to their original and correct positions; then with exercise, as may be demanded by the case, we should expect to see the patient get complete comfort.

There are in these cases, as in all cases, factors of individuality which can only be known and watched by the physician in charge, and upon close attention to these will often depend successes or failures.

DISCUSSION.

Dr. Eaton, of Portland, Ore.: In my paper yesterday, I put myself plainly on record as opposed to this theory of cyclophoria. It is hardly worth while to go into detail. I wish, however, to present two arguments which I did not present in my paper. There is a very large number of men in the profession who do not believe in this theory, far more than I think the reader of the paper will admit. One of the greatest reasons I have brought against this theory is the inability, among many persons, of finding one who has not the phenomena—in whom we cannot bring out the phenomena (by the very means he has described), of insufficiency of the superior obliques. The greatest objection that has been made, not by me but by others, to this theory, is interference with the correcting cylinders; ignoring the ciliary muscle in the interests of the oblique muscles. I would also refer to the paper to-day by Dr. Hobby, who says that in cases of asthenopia supposed to be caused by heterophoria, the majority of the cases are caused by ametropia, and not by heterophoria. Referring to the fatigue which Dr. Savage attributes to the exercise or strain put upon the oblique muscles by the cylinder, I would say that no one who has not an astigmatism corrected by putting on cylinders, can look through them at any time without suffering a certain amount of strain He details the fact that when the cylinders are turned or worn awhile, the strain is felt upon the obliques. This is pure assumption. I will draw attention to the fact stated of the rarity of insufficiency of the inferior obliques.

Now, it has been known for twenty years, as I stated yesterday, that rotation of the eyes upon their antero-posterior axes, takes place in convergence and I have satisfactorily proven that such rotation takes place in convergence at a distance of eighteen to twenty inches, and increases in proportion as the object is brought nearer. According to the experiments made by Dr. Savage's test,or by the vertical prism, all this immediately disappears as soon as the object is 45 degrees below the primary plane of vision. Meissner attributed this fact to the action of the inferior oblique muscles. Another thing: neither Dr. Savage nor Dr. Price has ever submitted to the profession a series of cases followed up an adequately long time, in which, after the exercise has been followed out, any of the relief which has been claimed, has been secured, i.e., whether by the same careful testing, obliquity of the line is present or not. I venture to say no person can be found in whom any amount of exercise can ovorcome the inevitable rotation of the eyes in convergence. If any person will put a candle at twenty feet and put on cylinders with their axes nearly vertical, the flame will be drawn out into two lines at right angles to the direction of the axes, but there is not the slightest incentive to any fusing of the lines of light. There is no such incentive as when looking at a line drawn upon a piece of paper, but there *is* a decided strain upon the ciliary muscle, caused by the cylinder.

Another thing I draw attention to, is the insistence on Dr. Savage's part, that such weak cylinders as one-half or one-quarter dioptry with their axes diverging or converging five or ten degrees from the vertical, that such a slight change will bring a strain upon one or the other oblique muscle. I said decidedly yesterday, that the amount of the disturbance of the retinal image caused by a strong cylinder of 2 D., is considerably less near the eye than at a distance of thirteen inches.

The 6 degrees of variation at thirteen inches, with the axis at 45 degrees, (its position of greatest deflection,) becomes only three-fourths of a degree close to the eye. You can therefore imagine how much deflection by the cornea is caused by an astigmatism of one-half D.

I wish to say in making the opposition I have to this theory, that I am actuated by a conscientious motive. I do not believe in the indifference shown to the theories which have not been worked out with due deference and care when they are originally presented to the profession.

I may say that this theory was sprung upon the profession without due regard to the writings of physiologists, nor with due consideration of the facts which I have given, and I believe it takes the attention of ophthalmologists from things which they should attend to, to things for which there is no foundation.

Dr. Erwin, Mansfield, Ohio: Mr. Chairman, unfortunately, I was not here early enough to hear Dr. Price's paper. And I have not studied Dr. Savage's doctrine enough to know all that there is in it, but there is one point I notice. It is that the oblique muscles are affected by the cylinder, especially if the cylinder is an oblique cylinder. The disbursement of the image on the retina by the oblique cylinders gets up a new kind of action on the part of the eye. The muscular action of the eye is so habituated that it becomes almost, if not altogether, involuntary. Now the least deviation from the habitual impression of the object upon the retina causes a complete change in the use of the oblique muscles of the eye, so as to require a voluntary action on the part of the oblique muscles.

When you have upset the habitual action of these muscles, and you make it necessary for a voluntary act on the part of the muscles, you see how likely you are to get a disturbance of that muscle in a short time. It is my observation that oblique cylinders had better not be prescribed at all, if there is only a low degree of astigmatism, unless you have a patient that is willing to suffer a good while before the muscles acquire their new use, that they have to acquire before they can become comfortable.

Dr. Simonton: Mr. Chairman, I do not wish to make any technical argument on this subject, for I do not know anything about it. I confess I have not given it sufficient consideration, but wish to say that when Dr. Stevens first brought out his ideas in regard to heterophoria, the whole profession pooh-poohed it—it could not be so, it was impossible—the results which he claimed could not be true. It has been demonstrated that most of the positions which he took are true. Now, this theory of cyclophoria is new to us and it is yet under discussion. It is an unsettled matter, and it is quite likely it will prove true to a greater or less extent. I am open to conviction.

Dr. Eaton.—Mr. Chairman, I would say that there is a little difference here. I was one of the first to recognize Dr. Stevens' views. I was operated on myself by Dr. Stevens. The conditions are quite different.

Dr. Price: Twenty-five per cent. of all the cases of whatever error that fall under our observation show insufficiency of the superior obliques. We test every case for insufficiency of the oblique muscles as we do for insufficiency of the other eye muscles, and we invariably do that before we put anything in the eyes. Dr. Eaton has referred to my not presenting cases. Gentlemen, if there is any one thing in the world that a Society or Section or body of men does object to, it is a great array of cases. I can produce from our record books hundred of cases in which we have detected cyclophoria, and in many cases where the cyclophoria has been relieved. I could relate case after case. The second case upon which we successfully used the cylinders for the purpose of correcting this condition by exercise was a lady who told us that for twelve years, she had not been able to read, write or sew. She had been in a condition of absolute idleness on account of her eyes. We did not know anything about cyclophoria then and we tried everything in the world that we could think of. She tried constitutional treatment for two or three years by physicians here, there and everywhere. She had consulted men everywhere, ophthalmologists, opticians and everybody else. When we did find out about this thing and put her upon exercise, the patient began to improve and in a short time left Nashville and went to the City of Mexico, and she says now she reads, writes and sews with comfort.

My experience is this: I have cyclophoria, insufficiency of the inferior obliques; I have never subjected myself to systematic and constant exercise, but occasionally I take exercise.

Had I insufficiency of the superior obliques, then convergence below the horizontal plane would add to my trouble; but having insufficiency of the inferiors, when I look below the horizontal as in reading, the inferior recti come to the aid of the weak inferior obliques and aid in maintaining parallelism of the naturally vertical meridians, hence it is rarely the case that I suffer, but now and then I find it necessary to resort to exercise of these muscles for relief, which relief comes promptly.

Dr. Eaton's statement to the effect that no one free from astigmatism can look through cylinders at any time without suffering a certain amount of strain, must be noticed. Such a patient can wear for quite a while cylinders, provided they are of the same strength and kind, their axes being vertical or horizontal, or even oblique, but in the latter case the axes must be parallel. A slight change in the position of the axes causes trouble which the patient cannot endure for any great length of time. For instance, if the cylinders are plus and the axes converge above, then extra strain is thrown upon the superior obliques, or if the cylinders are minus and the axes diverge above, the same effect is produced, hence the patient soon complains, unless, as in my case, he has insufficiency of the inferior obliques, which condition would be favored by the above positions of the plus and minus cylinders. So far as the ciliary strain is concerned, it is the same for all positions of the axes, provided the cylinders are the same.

It is quite evident, to my mind, that the discomfort induced by cylinders where the axes diverge or converge, is due to the strain thus thrown upon the obliques.

Dr. Eaton again states that it has been known for twenty years that there is rotation (outward) of the eyes on their antero-posterior axes in convergence. Does this argue anything against this theory of cyclophoria? Not at all. Many times conditions have been observed but unexplained for more than twenty years. Let us look into this a little further.

If the interni are not attached too high or too low, their action, when the visual axes are in the horizontal plane, cannot affect the parallelism of the vertical meridians; but when attached too low, then converging below this plane they augment the action of the inferior recti, whose action is to diverge above these vertical corneal meridians, which action is increased as the plane of the visual axes is depressed.

This being the case, it can hardly be possible that the want of parellelism disappears when the visual plane reachas 45° *below* the primary plane; maybe he intended to say 45° *above*, which would have been nearer correct. Another point to which I desire to call attention is this: Dr. Eaton says that neither Dr. Savage nor myself "has ever submitted to the profession a series of cases followed up an adequately long time, in which, after the exercise has been followed out, any of the relief which has been claimed has been secured, i.e., whether by the same careful test, the obliquity of the line is present or not." Allow me to say that we are not wanting in such cases, and that much has been stated by Dr. Savage in his book. He has given to the profession a plain, simple theory, one based on observation and one that can easily be demonstrated as correct by any careful observer. Dr. Savage also discovered, and gave to the profession, a method of treatment which has proven of great success in the hands of those who have given it a fair trial, as evidenced by the fact that both the symptoms and the sign (dipping of the line) have disappeared.

These cases are not limited to a few, but run to the hundreds. That he has not, and that I did not in my paper, detail a long array of cases is true, and if I had, it would have but consumed your valuable time.

This theory of cyclophoria and its treatment is before you and it but remains for you gentleman to give it a thorough test, to be convinced of its truth and practical value in the relief of your patients.

ASSOCIATION REPORTS.

The reports of Ophthalmic work done in the American Medical Association and in the British Medical Association will be continued in the next two or three issues of this journal. After that the work done in the Edinburgh Congress will be reported. While I have full notes of all the discussions had in the Congress, I must await the appearance of the volume of proceedings before I can get the character of abstracts of papers that would be most profitable to our readers.

There is, however, one very important matter brought out in the Congress which I wish to mention without further delay. It is the treatment of corneal ulcers by

IODOFORM, BORACIC ACID AND GELATIN DISCS.

This treatment was embodied in a paper read by Dr. Mules. His statements as to the rapidity of cures by this treatment were so strong that some doubted their correctness. Most of us must have resolved, however, to give the method a trial on our return home. I had Vaughn & Partee, of this city, undertake the making of these discs, and have used them in many instances, with most gratifying results. Some of these ulcers we have cured within the *three* days mentioned by Dr. Mules.

Mules' method is as follows: Cocainize the cornea, cover the diseased part with one of the discs and then apply a bandage. I understood him not to interfere with the bandage for three days, at the end of which time he usually found the ulcer cured. I have thought it better to make inspection every day and have applied, in all cases, a new disc after each inspection. After many experiments Messrs. Vaughn & Partee have succeeded in perfecting these discs so that they adhere readily to the diseased part and do not become hard and stiff.

G. C. Savage.

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CRITICISM CONCERNING RECENT VIEWS AS TO THE SECRETORY FUNCTION OF THE CILIARY BODY.*

By JOHN GRIFFITH, F.R.C.S.
Pathologist to the Royal Westminster Ophthalmic Hospital, London.

Mr. President and Gentlemen:

A critical review of this subject from its infancy would entail endless labor, necessitate a long rigmarole of different views and outcomes of experimental study, and, in the end, could scarcely be anything else than a feeble, distorted shadow of the masterly writings of Dr. W. Nicati, of Marseilles.

[1]Nicati has, in this recent work of his on the origin and destination of the aqueous humour, made an exhaustive collection of literature pertaining to it, entered fully into the anatomy and physiology of the ciliary region, besides giving a description of his own experimental researches, and the conclusion at which he has arrived. So recent and thorough a revision would leave little to write about, but for the opening up of a wider question by the discovery, almost at the same time as Nicati was elucidating this problem in France, of ciliary glands, by [2]Mr. Treacher Collins in this country.

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*Read in Section of Ophthalmology, British Medical Association, at Bristol, 1894.

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[1] La glande of l'humeur aqueuse. Archives d'ophtalmologie, 1890, p. 481.

[2] The glands of the ciliary body in the human eye. Trans. Ophth. Soc. Vol. xi. p. 55.

Collins, who has made a special study of the histology of the eye, attributes the formation of the aqueous humour to these glands.

Many English ophthalmologists have accepted his theory without dissent; others still cling to the older views that the ciliary processes form the fountain-head of this intra-ocular secretion.

Nicati terms the pars ciliaris retina, together with the subjacent pigmentary epithelium, "the gland of the aqueous humour, the gland of the ciliary processes, or the uveal gland," and considers it the elaborating organ through which the blood-serum derived from the chorio-capillaris passes in its preparation for aqueous fluid.

It has been proved sufficiently by the many experiments of Deutschmann, Ehrlich, Schocler and Uhthoff, Leplat, Memorsky, Leber, and others, that the ciliary region is responsible for this fluid, and so any discussion on that point would be superfluous. A preliminary account of the histology of the ciliary region must obviously be necessary to place this subject on a sound footing.

Upon looking at the minor aspect of the anterior half of a bisected eye from which the vitreous and lens have been removed, two zones are visible between the ora serrata and the base of the iris, a posterior, wider and darker zone without any distinct elevation—the pars non-plicata, and an anterior, narrower, and lighter portion, which is thrown into numerous meridional ridges—the pars plicata.

The pars plicata is an apparently complex structure, for it has given rise to many misshapen views and ideas, especially to microscopists; yet a correct knowledge of its anatomy, described by [1]Brailey, simplifies it considerably. Under the microscope these ciliary processes or ridges appear to be broken up into foliaceous papillæ, the anterior of which are often seen folded backwards. Such is not really the case; it is a histological deception, and is a consequence of their strange, undulating outline. It is, as one would expect, difficult, and I might say impossible, to get a perfect antero-posterior section of any single ridge. This undulating appearance is readily seen and understood in sections cut through a plane at right angles to their perpendicular; also in coronal sections.

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[1] Some points in the anatomy of the Ciliary Body. British Med. Journal, Vol. II. 1882, p. 577.

The acme of each ridge is in front, their height being a little less than 1 mm., their length about 1.5 mm.

Around the circumference of the lens, there are about seventy in number, and alternately, in the valleys between, are smaller ridges. Sometimes two of the latter are seen which coalesce anteriorly either by the gradual rising up of the floor between them, or, as pointed out by Brailey, by the fusion of their summits, which gives rise to short cæcal pits directed forward. The appearance produced by the undulations of the approximate sides of adjacent large ridges with the folded arrangement of the intervening embryonic ones, is very striking, and has the resemblance of a racemose gland. The reduplications are very extensive, and must increase the surface area of the anterior plicated zone considerably.

Upon microscopic examination, we find that the retina, not taking into account its pigmented epithelium, ceases at the ora serrata 5.5 mm. behind the sclero-corneal junction. Here its structural elements resolve themselves into a single layer of elongated cells, having a decided inclination forward. This can be traced as a non-pigmented membrane as far as the base of the iris, and constitutes the pars ciliaris retinæ.

In the hinder part of the non-plicated portion of the ciliary body, these cells are elongated and fusiform, subsiding gradually into columnar, and lastly cubical-shaped, elements, as they reach forward to the ciliary processes, around which they also retain this cubical form. From some of them, which no doubt are epiblastic and the representative of the retina, cords arise which, blending with the outer layer of the split hyaloid membrane, constitute the main structure of the suspensory ligament of the lens, and are inserted into the anterior aspect of the lens capsule near its equator. The structural peculiarities of the pigmentary epithelium in this region, the continuation forward of the tapetum nigrum of the retina, demand the fullest investigation. This can be done only by studying bleached sections, and to Collins is due the credit of having first attempted this with success. He points out the difficulty of his method in the following words:

"The manipulation of the sections requires considerable care, as, after exposure some time to Chlorine, they have a great tendency to come to pieces." He then describes how they fall away, and adds: "It is not easy to get a perfect section first bleached and then stained."

I fully endorse Collins' statement, having on several occasions attempted his method without success. The plan I have adopted is to my mind decidedly superior, as the chief difficulty is overcome, viz.: the brittleness of the specimen. The tissue is bleached *en bloc*; it cuts without difficulty, and the sections, not in the least brittle, will stain with eosin. In fact there is no trouble at all in the process if attention to detail be carried out. Many other bleaching solutions have been tried without success. Peroxide of hydrogen has proved too slow a process in my hands, though its bleaching properties are held in high esteem by the gentler, and would-be fairer sex.

The solution I recommend owes its bleaching properties, I am told, to the presence of euchlorine, which is a simple mixture of chlorine and chloric-dioxide.

$$8KClO_3 + 24HCl = 8KCl + 9Cl_2 + 6ClO_2 + 12H2O.$$

Bleached sections show, upon examination, a single layer of columnar, not flattened, cells, underlying the pars ciliaris retina, extending from the ora serrata to the bases of the ciliary processes. The rounded, outer extremities of these cells, sometimes devoid of pigment, appear separated from the lamina vitrea by a small interval, presumably a lymph channel. Their inner ends can be distinguished from the cells of the pars ciliaris retina by a delicate, crenulated line. Between the individual cells slender, sustentacular fibres can be seen standing on the membrane of Bruch by their triangular bases. Around the ciliary ridges these cells are cubical, and contain comparatively little pigment, especially those at the summits of the ridges. This single row of columnar cells throughout the length of the pars non-plicata, I have seen only in the ciliary region of glaucomatous eyes, yet I consider it a normal condition.

In healthy eyes, those removed for injury or post-mortem, they are in some parts seen to be reduplicated by doubling outwards similar to the backward folding of the cells constituting the pars retinalis iridis.

This condition of the cells on the back of the iris appears dependent upon the movements of the latter; such an active membrane must have some arrangement of this kind. The more dilated the pupil the more corrugated would be its epithelium, and the converse.

Similarly, we must expect changes in the epithelium of the ciliary region resulting from the act of accommodation. In eyes in which I have found the pigmented epithelium thrown into folds, I have also found the lamina vitrea wrinkled, whereas in eyes in which only a single layer can be seen, this membrane of Bruch is found taut. The only inference that can be drawn from these facts, is that they depend upon the contraction of the ciliary muscle. The forward direction of the cells of the pars ciliaris retina, and their intimate relation to the fibres which form the suspensory ligament of the lens, will account for the absence of folding in them. It is probable that they elongate during accommodation. If, therefore, we find the pigmented epithelium a corrugated membrane, it is due to the rigor mortis state of the ciliary muscle just as we often see similar post-mortem contractions in the unstriped muscle fibres of the intestinal tract.

Before I discuss the existence of true ciliary glands, allow me to make a few remarks on the apparent glands of this region.

How very difficult it is, as has already been pointed out, to make a complete antero-posterior section of a single ciliary ridge without passing through one or other of its side-walls, owing to their sinuous outline. Consequently, a closed space, or one opening by a narrow neck, may often be seen lined with both layers of epithelium, and may be mistaken for a gland. Again, the extensive folding between the processes may simulate a racemose gland, though here also both layers of epithelium are seen. Greef thought that Collins, in his communication, referred to these apparent glands, and, therefore, objected to the term "glands of the aqueous humour," preferring the expression, "secreting surface"; it is only an infolding of the surface epithelium and not a true glandular formation. I might, incidentally, mention that he is not alone in this wrong impression. A section through one of those cæcal diverticula of Brailey, would also be rather deceptive.

Another cause of error is the appearance of the pigmented columnar epithelium in the pars non-plicata, for each cell looks like a small, simple, tubular gland, owing to its outer extremity being rounded, sharply defined in many instances by the pigment, and forming with other cells a row of finger-like processes. The out-folding of the pigmented cells from the contraction of the ciliary muscle already described, is one that may also easily give rise to false deductions.

With so many fallacies and pit-falls, can we in safety acknowledge the existence of any true glands? Certainly we may. The tubular and pyriform glands described by Collins as existing at the junction of the plicated with the non-plicated portions of the ciliary body, are true glandular structures, though not many in number or very large in size. They are cellular outgrowths from the pigmented epithelium, are flask-shaped or tubular, and some contain a lumen. Similar glands are seen between the ridges, and one or two in the pars non-plicata. It must be quite understood that the cells of the pars ciliaris retina do not participate in this outgrowth. Also, these glands in the natural state are deeply pigmented.

Beneath this melanotic epithelium the lamina vitrea is seen continuous with that of the choroid, and traceable as far as the ciliary ridges, where it becomes lost to view. Between this membrane and the ciliary muscle, a connective tissue framework accompanies the vessels, nerves, etc. The vascular arrangement may briefly be described thus: Around the circumference of the eye-ball, near the base of the iris, within the ciliary body, there is an arterial circle from which branches proceed to each of the ciliary ridges and break up into a free, inosculating plexus of fine capillaries on their walls. A venule forms at the summit of each fold and, passing backwards along its free border, carries the venous blood away to the choroid. There is no similar dense, capillary network in the pars non-plicata; in fact, this region is more poorly supplied with blood than in any other part of the tunica vasculosa of the eye-ball. I have come to these conclusions mainly from the examination of injected eyes of albino rabbits, and so cannot be dogmatic; but I feel convinced from the examination of a number of specimens, that this region is equally ill-favoured in the human eye. Nicati is of opinion that the vascular arrangement of the ciliary processes is similar to that of the choroid. To quote his words, "the ciliary epithelium rests on a layer of vessels—an expansion of the chorio-capillaris." Judging from analogy, it would not be right to accept this statement. It is not at all in accordance with what is seen on examining the injected tunica vasculosa of an albino rabbit on the flat; the sudden cessation of the chorio-capillaris and venous system of the choroid at the ora serrata is a most striking feature. The blood circulation of the choroid is quite characteristic. Differing materially from that of the iris and ciliary body, and, stopping abruptly as it does at the ora serrata, must be for some special retinal purpose. This, however, Nicati does not allow, for he says that the chorio-capillaris lies between two impermeable membranes, the lamina vitrea internally and the intervascular membrane of Sattler (tapetum) externally, and any exudation from this capillary plexus must of necessity pass forward to the ciliary region, and there by a process of metabolism be converted into the aqueous humour. He boldly states that Sattler, with all other authors, is wrong in attributing to the chorio-capillaris the part of nutrition of the retina. This new origin of fluid to form the aqueous humour, seems too theoretical to gain universal acceptance. The fact that such a close meshwork of large capillaries exists over exactly the same area as the sensitive retina, and that it is especially fine at the back of the eye-ball near the yellow spot (Schafer[1]), it seems more feasible to accept Sattler's hypothesis. Extensive choroidal changes may occur without much alteration in the tension of the eye; if, however, cyclitis be present the tension is raised, and the subsequent atrophy of the ciliary body is attended with diminished tension. These points are certainly in favor of the fluid being derived from the blood-vessels of the ciliary processes, as suggested by Mackenzie some years ago, rather than from those of the choroid.

Why should the membrane of Bruch be considered an impermeable structure, for similar membranes, the capsule of the lens and the hyaloid membrane, allow fluid to permeate them?

Does the tapetum between the two vascular strata of the choroid in some mammal, or the analogous, iridescent epithelial cells of Sattler as seen in fish, exist in man? No similar membrane can be seen with the microscope, and its presence seems more than doubtful.

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[1] Quain's Anatomy, Vol. III. Part III. 1894.

What part the pyriform glands of Collins take in the secretion of the aqueous fluid, is a point worthy of great consideration, for this function has been attributed to them by their discoverer. He bases his arguments partly on histological, and partly on pathological grounds.

The existence of a few glands in the ciliary body appears to be the sole evidence that can carry any weight in favor of his theory. I emphasize "few," because I have never been able to find the numbers stated by that author, who says: "Their number in any one section it is impossible to count. The number in the whole circumference of the globe must be something enormous."

Now I find, with the exception of two or three glands in a single section, no other structure that can be considered glandular in the pars non-plicata, which, according to him, is a conglom eration of glands. I of course exclude the immediate vicinity of the ciliary processes.

He may mistake the folding of the epithelium, which I attribute to the contraction of the ciliary muscles, for glands.

The simple columnar cells, which resemble somewhat tubular glands while loaded with pigment granules, cannot possibly give rise to error when bleached.

Two fundamental facts justify the exclusion of these cellular plaits from the type of ordinary glandular formations: First of all, the absence of any corresponding depression in the basement membrane, which, here, is the lamina vitrea; secondly, the occasional absence of any such folding or reduplication of these cells. Besides, a gland must surely be composed of more than four cells, as seen on section, which these so-called glands never do. Would we not expect a free network of capillaries beneath these apparent glands if they were real? but we have no proof that such exists.

There is not sufficient time to allow me to enter fully into the pathological evidence which is brought forward. I must, however, deny that ridiculous theory of glandular hyperplasia in cyclitic membranes, enuciated by Alt and accepted by Collins.

Can it be possible for a gland from the stimulus of inflammation, to sprout out into a mass of inflammatory material and form a more highly organized structure than the original? Is it not contrary to all pathological dicta? Where can we find a parallel phenomenon? It is truly absurd, and cannot be contemplated as based on sound, scientific principles. Some of these exuberant glands are, in reality, due to folding of the epithelium, both pigmented and non-pigmented, from the cicatricial contraction of the inflammatory material in the process of organization. Others, and the variety to which Alt seems to refer, are those peculiar, branching and anastomosing cellular rods, or columns, seen in so-called cyclitic membranes; some cells containing pigment, others not. Such are more sensibly explained by assuming them to be newly-formed, lymph channels congested with leucocytes, performing a useful work in clearing away the melanotic debris of the disintegrated pigment cells from the site of the recent inflammatory battle. In other words, a process of phagocytosis, or undertakers burying their dead.

Do the ciliary processes, or the ciliary glands, secrete the aqueous fluid? One ciliary process must be capable of secreting many times the quantity of several glands, if size is to be taken into consideration. It is exceptional to find more than half a dozen glands in any one section.

Let it be assumed for a moment that they do constitute the intraocular secretory apparatus. Then, what use are the ciliary ridges? Their existence must not be wholly disregarded; in fact, a more important function should be assigned to them in proportion to their magnificence. But we cannot do so. Placing aside the question of size, it is possible to bring forward a more substantial argument against this glandular theory. Why did not Nicati recognize them? He makes no mention of them in his paper. The reason is obvious. He made his experiments and examinations chiefly on the eyes of albino rabbits; in them no such glands can be found, yet they are not devoid of an aqueous humour. What then secretes it? Presumably, the ciliary processes which do exist.

Just a few words about the experiments of Greef. He tapped the anterior chamber of a number of rabbits, and examined them at different periods, afterwards, and found the cells lining the processes, epecially those on their anterior aspect, distended with coagulated fluid similar to the coagulable fluid which takes the place of the aqueous humour in the anterior chamber shortly after that cavity has been evacuated.

I have had the opportunity of examining the ciliary region of eyes which have been excised within a short time after perforating injuries. The cells of the ciliary ridges show a similar condition to that described by Greef. The epithelium appears to be distorted with vacuoles which, no doubt, are aqueous droplets. They, however, have not taken, even faintly, any stain, so cannot be considered coagulated fibrin. This condition is, no doubt, an exaggerated form of the normal secretory process.

Seventy-four years ago, [1]John Vetch wrote as follows: "In assigning to the ciliary processes the office of a gland, I was not aware that Dr. Young had already supposed that this might be their use, if the production of the aqueous humour required such an explanation. As the secretion of the fluid, after closure of the pupil, proves that it takes place behind the uvea, this destination of the ciliary processes is rendered very probable."

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[1] A practical treatise on the Diseases of the Eye, by John Vetch. London, 1820.

There has arisen since that time little substantial evidence to overthrow Dr. Young's theory, and I sincerely believe that it is through the mediation of the ciliary processes, alone, that the aqueous humour is formed.

Having, in the main, refuted the hypothesis expounded by Collins, I should not feel I had done so without prejudice if I could not attribute some function to the ciliary glands which have been robbed of their colours. I have found them to exist in greater numbers, and of large size in dark-brown eyes; in blue eyes they are present, but much less prominent, and in the eyes of albino rabbits, I have already said, they are not to be found. It seems to strike me forcibly that they control the amount of pigment in the eye and regenerate it, as nature demands.

"CATARACT EXTRACTION AN OFFICE OPERATION," SOMETIMES. (AND MOST OF THE TIME.)

By Dr. J. W. C. LOVE, of the City of Mexico,

Formerly Oculist and Aurist to the Civil and Military Hospitals in cities of Morelea, and Hopil Loreta, at Vera Cruz, Mexico.

The most of my cataract operations have been office operations, since 1882 (twelve years and a half), and now I will describe my procedure, as I think it necessary to justify myself.

With pupil thoroughly dilated with atropine, and thoroughly anesthetized with cocaine, I place the patient in a straight back chair, facing a good light. With speculum in, I make the incision shown in Figs. 1. and 2, and finish as shown in Figs. 5 and 6. All figures or cuts represent right eye, and operator standing behind, using right hand, and as I am ambidexter, of course, apply same principles operating on the left eye.

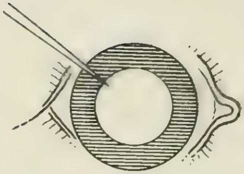
Fig. 1 shows the narrow knife passed through cornea to pupilary edge of the iris; then I raise the handle up and out from the face (Fig. 2) and dip into edge of lens capsule, and gently pass it through the anterior lens capsule, and then out and over edge of iris, as seen in cuts Nos. 3 and 4. Then lowering knife handle, finish section in cornea as well as lens capsule, at angle shown in Figs. 5 and 6.

Figs. 2, 3 and 4 show heel of knife stationary, and the point passing gently curving and cutting through capsule, with point out over the edge of iris.

Fig. 3 shows point advancing until it is in position to cut out through cornea, as shown in Fig. 4, and then finished as shown in Fig. 6.

The lens I take out in usual way, never performing iridectomy, unless there are iritic adhesions. The four-fifths or more of the front side of lens capsule cut away, falls down, and in time becomes absorbed or is completely out of the way of the pupil and vision, when iris regains its natural position. Getting the cataract out is perhaps the most particular part of the operaion, and especially to take out all lamina or lenticular matter; and the following is my method:

I take a rubber lens scoop, curved on the back about half an inch up towards the handle, with the hollow of the scoop on inside of the curve; and with back press gently on cornea until lens makes an edge "presentation" and comes out, and then lift it away with the hollow side. If any lens matter is left, I take it out with a fenstrated scoop, and if any particles fall back that I can't get out in this way, I use a very small pipette (medicine droper) curved, with very smooth point, and inject a *sterilized saturated* solution of Boracic acid in, *gently* wash them into view, and suck them out with same. I *never hurry* in the operation. When ready to cover or dress the eye, I contract pupil with a weak solution of eserine (it contracts pupil so that prolaps of iris is *always* avoided with me), and allow its effects to wear gradually away. Then on about third or fourth day, I dilate pupil with atropine to draw iris away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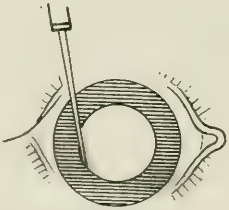
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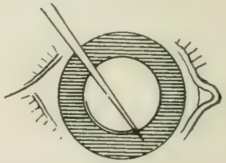
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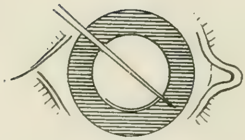
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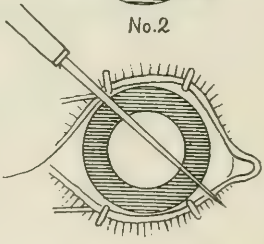
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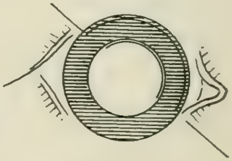
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from any capsule substance. It is *rarely* necessary, after this operation, to have to do a secondary or needle operation.

"In so precious a thing as vision," as Dr. Lucian Howe puts it, in your September Record, I do not think "fads," should have any part; and will now describe my process of bandaging the eye, and the liberty I give my patients! I cannot believe it is safe to let them go "one eye on it" (one eye open), although I give my patients generally more liberty than anybody except Dr. Julian Chisolm, of Baltimore, whom I have seen operate most beautifully, pinching the anterior capsule off, in the prettiest manner I have seen or read of. The principal part being finished, I think bandaging the eye a most important part. After cleansing the eye with anticeptic solution (Hydrargiri Bichoridi usual strength), I then put a piece of muslin wet with the same, over both eyes, then small pieces of cotton-wool, according to depression of eyes and projection of nose, frontal and cheek bones, and then a bandage made thus: —I make a bandage long enough to go around the head three times, about two inches wide, the inner third of black calico, to dispense with dark or shaded room, the other two thirds of nuns veiling or light flannel, a little elastic, if in cold weather, or bobinet if summer. The black third I put next to the eye (over the cotton), straight across and around; the next two thirds I wind around the head twice, letting the first round cover one ear (nearly) low down on one side and high up on the other, and the second round the reverse to this, thus making the two white flolds of the bandage form a long X horrizontally over the eyes and nose. Then I put a piece of elastic cloth, nuns veiling or bobinet, about as wide as a hand, across the top of the head, and pin the four corners, thus forming a close fitting cap. I spread the bands apart behind, and put in a stay-pin to keep in place. I do not put this band on the eyes tight, but by means of the cloth over the head, pinned at its four corners, at about equal distances around the head, it protects eyes better than any other way, I think.

Now the curtain rises on the new act (to some). I send them home or to hotel from my office, with some one leading them carefully.

Thus the "Cataract Extraction an Office Operation," has been practiced with slight modifications by me for twelve years and more.

When I came to Mexico first, twelve years ago, there were few Oculists, and I was, and am now, often called to adjoining cities and towns, where there are none; and as there were a great many cataracts, especially among the poor, knowing it was the first, and probably the last opportunity many of these poor would have to receive sight, I operated and treated them as above described. I want to say that I make exceptions occasionally—in cases of feeble old people, when the patient is very nervous, afraid or unruly. And I want to say further, that I do not treat these people slightly. Fashions, or what one Oculist does, may not be the best for another; and no one ought to venture, except those with experience, and then always remember "so precious a thing as vision is at stake."

Excuse me if I seem presumptuous when I say, in substantiation of my preferred operation and treatment, that I am not a "beginner," having operated upon eight cataracts in one day, and forty-seven in one month.

When the eye is closed, the angle of incision or section in cornea is thoroughly covered with the natural cover of the eye, and the curvature of the cornea is preserved, and lips of section are kept in exact place by the curvature of the tarsal cartilage; and thus I have less astigmatism, and when present, less in degree than most Oculists. I heard in person, one of the writers in the RECORD, who likes, and often performs, cataract operations, and lets his patients "go one eye on it" after the operations, complain of his great per cent. of astigmatism, after the operation. To me the cause seemed clear. I want to call attention to one important fact. Though a patient should imprudently take bandage off, and open the eye; or as Lucien Howe, M.D., in late number of the RECORD, says: "just to fix the bandage a little," they are not liable to do harm, or, not as liable as in the horizontal section. Where the horizontal section has been made, any elevation of the lid can, and some times does, cause wrinkling of the flap, breaking or partially interrupting the healing, and sometimes causing prolaps of iris. After the oblique section, the edge of the lid moves over the part almost at right angles to the section, and finds no edge or unevenness to catch to, to cause breaking up of adhesions or wrinkling of the flap. But bear in mind, the kind of bandage I use is not easily removed, and its fixture and appearance to the home, or other folks inclined "just to fix the band a little," will give the impression that it is fixed to stay, or to be removed only by the Doctor, and they will not be apt to meddle with it.

It is not often necessary to put more than one instrument in the eye (the cataract knife) especially if it is a senile (or ripe) one.

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY, A.M. ASSOCIATION, SAN FRANCISCO MEETING, 1894.*

ABSTRACTS OF PAPERS; DISCUSSIONS IN FULL; REPORTED BY G. H. PRICE, M.D.

[*Continued from page 199, current volume.*]

RETINOSCOPY AS A CRUCIAL TEST IN MEASURING ERRORS OF REFRACTION.

By **B. ALEX. RANDALL, A.M., M.D., Philadelphia, Pa.**

After stating in his paper that he used the plain mirror in his retinoscopic work, he then defined the limits within which it had the greatest practical value. The following two paragraphs we quote from his paper:

"In my routine examination of a patient, retinoscopy follows the subjective tests, for far and near, of the vision and muscle balance. In the moderately darkened room, with an argand burner shaded by a metal chimney presenting an opening an inch and a half in diameter, the light is thrown by a plane mirror from a distance of three or more meters, while the patient gazes at a dark surface behind me. Under these circumstances a medium pupil (four to six millimeters) is almost invariably obtained, in which there is rarely any difficulty in seeing and determining the motions of the shadows. M. and H. are thus readily differentiated, with the presence and axis of any astigmatism, and a rough quantitative estimate can be made from the distinctness and rapidity of movement of the shadow. Mixed astigmatism, usually the most difficult error to uncover, is

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*This report is taken largely from *The Journal.*

by this method the easiest and most unmistakable. With very narrow pupils, hazy media or unsteady patients, some little difficulty may compel a closer approach; but if the examiner's head be a little lower than the patients, this can generally be avoided and the test satisfactorily made at even greater distances. As the pupil is not strongly illuminated, the mirror must have an ample sight-hole, free from annoying reflections.

"For this, some painstaking in the illumination may be required in order to give readily the desired accuracy. Theoretically, we should obtain the emmetropic appearance at a distance of four meters only when M=.25 is present. Practically this rarely holds good, probably because the pupil is wide enough in most cases, even when no mydriatic has been employed, to give a peripheral refraction higher by thus much than that at the pupillary center, and also because we usually compare results with the subjective correction for six meters, which is slightly over-correcting for distance. I look therefore, for a central, comma-like shadow, rotating or varying with the shifting light, yet moving neither against nor with the motion of the light upon the face. If this be obtained with +.75, for instance, it will be found that +.90, the old 42, gives a distinct myopic shadow moving in the pupil against the mirror, while +.65 is as clearly an under-correction and gives a shadow moving with the mirror. So it is fair to claim that errors as small as 0.1 in any or all meridians can be recognized by this method under favorable conditions. Indeed, I have seen cases where 1 D. was as clearly too strong as .90 was too weak; and one could assert that there was not so much as .05 D. of astigmatism. This minuteness of measurement is as true of one meridian as of all; and the axis of any uncorrected astigmatism can generally be determined within 5 degrees with the same ease and accuracy. It seems just to say, then, that this is the most minutely exact measure at our command."

Following Dr. Randall, a paper on

THE STATUS OF SKIASCOPY.

By Dr. H. V. WURDEMANN, A.M., M.D., Milwaukee, Wis.,

was read. The Doctor claimed that, of all the methods of testing for errors of refraction, skiascopy occupied the first place. We quote the following paragraphs from his paper:

"From the perusal of recent English and German literature, it would seem that even though the shadow test has been in common use in this country and France for a decade, the profession on the other side has not taken up the method to the extent that we have. In this country, I think that it may be said all the progressive workers use it and do not consider the refracting of any case complete unless skiascopy has been called into service. Within a couple of years the acquisition of this method will be deemed as necessary by the foremost specialists of all the world as it is here. Six years ago I was astonished by the ignorance of the German oculists regarding skiascopy, as it was then, as now, foremost in my mind as being the principal objective method of measuring the eye. It is different now, and I understand that the shadow test is being generally taken up even in the clinics of Germany. Personally, I voice the opinion of its value given by your committee, and use it a number of times a day in my private practice.

"In what cases should the shadow test be used? I should say in *all* patients for whom lenses are to be prescribed. I hold it to be an absolute necessity for the scientific refractionist to know in every instance the total refraction of the eye before putting on lenses. I would no more think of fitting spectacles to a presbyopic patient, by trying lenses at the near point alone without knowing his refraction, than I would of prescribing glasses in ametropia by one or more of the objective tests without recourse to the subjective method for confirmation.

"The few instances in which skiascopy is unreliable or inapplicable are limited to those cases in which a definite visual zone cannot be isolated. These eyes are the exception and yet where carefully used, in irregular corneal curvature, in conical cornea, in partial lenticular or corneal opacities and in very high grades of astigmatism, skiascopy is of value as a confirmatory test. 'In nearly all eyes the result of careful skiascopic examination will give the best obtainable vision.'

"For skiascopic results to agree with those elicited by prolonged subjective tests, the examination should be conducted in the visual line, the refraction of the macula only being measured. Skiascopy measures the static refraction of the eye when applied in the visual zone, exactly as it is at the time of the examination, whether modified by the accommodation or not. Thus, in young persons, as a rule, a mydriatic should be used. Skiascopy is of value in the proving of measurements found by the other methods, just like the proving of an example in vulgar fractions, by again applying the shadow test with the combination of lenses decided upon from the trial case. It may thus be used as a check upon the other methods and upon itself."

In closing his paper the Doctor made reference to the skiascope invented by himself, and demonstrated its utility.

The title of the next paper was

THE VISUAL ZONE OF THE DIOPTRIC MEDIA AND ITS STUDY BY SKIASCOPY.

By EDWARD JACKSON, A.M., M.D., Philadelphia, Pa.

We quote the following paragraphs from his paper:

"The practical importance of the study of the visual zone, and the relation of its refraction to that of other parts of the dilated pupil, is very great, and the facts revealed by such a study will powerfully influence the prescription of correcting lenses. How great this importance is, and how much the practice of lens prescribing is likely to be influenced will only be appreciated by one who has made at least a few careful studies of this kind. Leaving it aside for some future communication, I wish simply to speak now of essential methods of such study.

"The area of the pupil that may be regarded as having the same refraction depends on the exactness or minuteness of discrimination that it is desired to make. If one says roughly a certain eye is hyperopic or a certain eye is highly myopic, this may apply to the whole dilated pupil. If he says the eye has so many dioptres of hyperopia or so many dioptres of myopia, and is willing to ignore variations of less than 1 D., what he says may apply to the whole of the pupillary area as it exists under conditions of ordinary illumination. But, if he desires to be more discriminating, to recognize the smallest differences of refraction that can be recognized by skiascopy, he will find, in almost all cases, that such a pupillary area presents marked variations. And in a certain number of cases of eyes that would not ordinarily be regarded as exhibiting conical cornea, or marked irregular astigmatism, the area of the pupil even contracted by strong light and for near work, will show variations in refraction of the greater part of a whole dioptre.

"From these facts, it follows that the accurate application of skiascopy, the careful study of the visual zone and the relation of its refraction to that of the surrounding proportions of the pupil is a study of the *movements of light and shadow in small areas* of the pupil, not across the pupil as a whole.

"To study a small object one must bring it near the eyes; hence such studies of the pupil must be made within a comparatively short distance. Distinct movements in an area three millimeters in diameter cannot be conveniently studied beyond the distance of a meter and can be most readily studied at a considerably shorter distance. There are not a few eyes capable of visual acuteness quite up to the normal standard, in which the light that goes to form definite images enters through a smaller area of the pupil than this, and the true refraction of the eye, therefore, can be studied only at a shorter distance, a distance of one-half or even one-third of a meter.

"Again, to have a distinct area of light in such a limited space, it becomes highly important that the source of light be small. Such a study cannot be made unless the ordinary lamp flame be covered with an opaque chimney with a small aperture. For my own work, with the plane mirror, I have for the last year found an aperture giving a circle of light five millimeters in diameter most satisfactory. With such a source of light, properly placed close to the mirror, and the sight-hole of the mirror not more than two and a half or three millimeters in diameter, the study of the movement of light and shadow is as easily made at one-half meter, revealing the differences of refraction in different parts of the pupil, as is the rough study at one meter distance or more, by the methods ordinarily described which have so frequently misled the surgeon."

DISCUSSIONS.

At the close of Dr. Jackson's paper the three kindred papers were discussed together. The discussions we give in full:

DR. F. B. EATON: In the employment of the several objective tests under discussion without mydriatic, I prefer to begin with skiascopy, since a certain amount of accommodative adjustment brought about by the subjective tests and by the fixation by the patient of the tube of the ophthalmometer.

I employ the ophthalmoscopic mirror with Dr. Wurdemann's skiascope and without a mydriatic. If the pupil is small, the patient must fix some object considerably to the right or left that a reflex may be secured; hence the importance of a very dark room and covered flame. I occupy a middle ground between the extreme views of those who eulogize, and those who take as partial only, the finding of Javal's ophthalmometer. I believe that many of the discrepancies between its findings and those under mydriasis result from imperfect illumination, and because the patient's head is not level. This latter defect can be remedied best by the American model, which provides a horizontal slit through which the observer can insure the levelness of the patient's brows with the top edge of the slit. Again, the patient must fix a point on the anterior lens of the instrument, which is in its axis, since then the observer measures the cornea at that portion cut by the visual line.

DR. S. B. DAVIS, Stockton, Cal.: In my use of the ophthalmometer, I have found that I had better results in most cases by placing the axis at 90 degrees, if the instrument showed it to be near 90.

DR. SIMONTON, San Jose: While the objective methods mentioned are theoretically within certain limits correct, yet it is a fact in practice that many mistakes are made by those relying almost wholly on these methods. Many of these cases require refitting, and ordinarily by use of the old trial case. In-asmuch as the various objective methods afford latitude for the exercise of much judgment, it is evident that all ophthalmologists are not equally endowed with skill and acuteness of judgment and this, accompanied by usual haste, results in many mistakes.

DR. R. D. GIBSON, Youngstown, Ohio: The results are not always the same in the same eye. A case showing plus .50 D. astigmatism may, after some months of over-taxation in school, return with conjunctivitis and an increase of the corneal astigmatism. This increase I have seen reach as high as 4 D. and after relieving the conjunctivitis and blepharospasm, the high degree of astigmatism vanishes and the results of the first examination found to be correct. Again, I have found astigmatism for which I have prescribed correcting lenses with great comfort and satisfaction, and after some months or a year, find no astigmatism, and only a spherical correction necessary.

DR. FRED BAKER, San Diego, Cal : To repeat much that has been said, I wish to plead for greater charity in our treatment of our brother practitioners, when we are called upon to overhaul their work. I have grown more charitable since finding that as large a share of my own cases show slight changes in a second test made after six months or a year, as of those which come to me from other practitioners, though I know that the first test of my own patients were carefully made. Every one must find that certain patients show these changes after a time, which must be due to the relief of strain given to the ciliary muscles by the wearing of the first pair of glasses.

As to objective tests, while it must be true that all of us in the rush of business neglect to give sufficient time to all patients, still it must be admitted that the oculist who combines most methods of testing will do more accurate work than he who uses only one. I have yet to meet personally any ophthalmologist who has given any of the objective methods a full and careful trial, who has not admitted the practical value of the method.

Dr. W. E. Briggs, Sacramento, Cal.: I agree with Dr. Riley in the statement that the trial test case will be our last and most important means of ordering glasses; but the more the profession uses the objective methods, the more general they will become. I believe, in time, all ophthalmologists will use both skiascopy and Javal's ophthalmometer. These methods of testing are not always necessary, but cases are common in which we cannot readily obtain a result without some objective test. As for myself, I would feel quite at a loss to make my examinations without the ophthalmometer and skiascopy.

Dr. Albert R. Baker, Cleveland, Ohio: I am pleased with the report of the committee in that they have given great prominence to skiascopy as an objective test for the determination of ametropia. In 1881-'82, I spent considerable time in the Royal London Ophthalmic Hospital (Moorfields), about the time skiascopy was first introduced in that institution. Probably one-half of the patients applying for relief could not read and we found this objective test of great value in these cases.

Upon returning to this country in 1883, I published several papers on this subject, but as they received but little consideration I became somewhat discouraged in attempting to secure a hearing. I was greatly pleased when Dr. Jackson took up the subject and succeeded in placing this objective test where it belongs as one of the most valuable. No doubt the present excellent report will serve to make the use of skiascopy more general.

Dr. L. R. Ryan, Galesburg, Ill.: The use of the old trial lens should not be discarded. The thoughtful physician and progressive man will use all the methods at his command. It is in the majority of cases a matter of personal preference. The man who studies skiascopy carefully and uses it extensively can do better work than one who devotes little time to it. The same might be said of the other methods of refraction. When we consider that the majority of cases of refraction are simple; that is, the axes of astigmatism are regular either at 180 degrees or 90 degrees, and that the patients are people of average intelligence and perception, by the use of the trial case we can fit glasses more rapidly and accurately. We have all the benefit of the patient's intelligence as to clearness of outline and ease of glasses. By a careful study of subjective symptoms one can tell almost by intuition what the refractive error is, and in the vast majority of cases can make a rapid fit. In suitable cases, however, skiascopy and all the other methods are excellent, and should be used, but the old trial frame still has a place and an important one.

Dr. H. V. Wurdemann, Milwaukee: Our branch of therapeutics is the most scientific of all the branches of medicine, and this refractive work is, or should be, the most accurate, as it is based upon physical and mathematical data. The physician who bases his glass fitting upon such ground necessarily does better work than those who depend entirely upon unskilled testimony of the patient. In the opening sentence of the report of your

Committee, the fact was stated that the objective tests were a necessary preliminary to the subjective method, and the latter is not to be done away with, but is the court of last resort. We may even go further with the subjective method, and say that the final judgment of the patient himself after he has had our prescription filled, is a highly important point. Thus we cannot do without the trial case. The advantages of the objective methods have been set forth in your committee's report and I need not repeat them here.

One of the most important offices of the objective method is the clearing up of doubtful points excited by the subjective examination. Thus at the trial case a patient may accept equally well one or any of the following combinations:

Plus .50 sph. ⊃ plus 1.25 cyl.
Plus .75 sph. ⊃ plus 1.00 cyl.
Plus 1.00 sph. ⊃ .75 cyl.

Without repeated sittings, by the trial set alone it would be difficult for the operator to decide which would most nearly neutralize the patient's error of refraction. Skiascopy settles the question immediately to the skilled operator. There has been some question raised as to the fixation of the patient's eyes. The examination should be conducted as nearly as possible in the visual line of the patient. Fixing the aperture of the mirror would do this, yet reflection of the same on the anterior surface of the cornea would confuse the operator, and when used without a mydriatic, the bright light falling most directly upon the fovea would tend to produce iritic and ciliary contraction. For general purposes it is better to have the patient look over the operator's shoulder at some distant object. I accomplish this purpose by having curtains at the door of my dark room, through which, when slightly opened the patient looks at a wall four meters distance. This method secures relaxation of the subject's accommodation.

In regard to the order in which the tests should be taken up, I consider it advisable to go from the coarser to the finer tests, as the former give valuable hints as to the finer measurements to be expected from the latter; taking up the examination in the following order:

Visual acuteness and astigmatic lines, keratometry, direct ophthalmoscopy, skiascopy, the subjective methods and then skiascopy again for corroboration of the whole test. Naturally, as in any other skilled work, much depends upon the observer, but even to those who, either by reasons of physical disability or mental hebetude, have not been able to acquire sufficient skill for the finest work, these objective tests prove of material benefit.

DR. LEWIS H. TAYLOR, Wilkes-Barre, Pa.: In regard to the use of the ophthalmometer, I can say that I have recently come to regard it as a most useful aid to the rapid determination of astigmatism. A few years ago in a discussion of this subject we heard the ophthalmometer referred to as an instrument that might be regarded as an interesting toy, and which would soon be relegated to the lumber room as something too useless to occupy the busy oculist's valuable time. Now, Mr. Chairman, I do not so regard it, but I find it daily of more and more value. We mistake greatly if we regard it as an accurate determiner, if I may use the word, of the exact refraction; it is only an aid, but a most valuable aid. I formerly regarded the subjective test with atropia, as the only method worthy of serious consideration, but now I am free to say that I use atropia far less than formerly. Ophthalmometry will not entirely take the place of subjective tests, nor will any other method, but I have frequently had patients return who had been wearing glasses with reasonable comfort for whom I could get a much more satisfactory correction than by the old method. The difficulty too often lies in the fact that some one devotes exclusive attention to one method, and claims too much for it; another tries it superficially and does not get such good results; he denounces the method and discards it. Both are in error: the middle ground here as elsewhere is the safest.

Dr. A. J. Erwin, Mansfield, Ohio: I do not believe it important what instrument, or which of the methods in use, be employed in working refraction, so that we are only expert in our method, and expertnesss is necessary in any method in order to have good work. In regard to the varying of the degree of astigmatism, in any case it is doubtless due to the power of the accommodation at the time of the examination.

Dr. Jackson, in closing the discussion, said: Dr. Randall, in using skiascopy to obtain his extremely accurate results at greater distance than I have advised, works with the undilated pupil, thus excluding the extra-visual zone. Yet even then he did not find it necessary to make the theoretical allowance for distance. Now it is a fact that in the majority of cases the refraction of the extra-visual zone shows higher hyperopia or lower myopia than the visual zone, so that for this extra-visual zone such an allowance is out of place. Evidently under these conditions, the results have been appreciably affected by the refraction of this extra-visual zone.

In regard to the illumination of the ophthalmometer: it should be remembered that we are studying the reflection from a transparent membrane, and that its distinctness will depend both on the illumination of the reflected object, and on the absence of light transmitted from behind the cornea, and for this reason it is almost as important to keep the eye shaded as to illuminate the disc and mires.

In reply to the questions as to the percentage of cases in which the ophthalmometer can be relied on for the prescription of lenses, I have recently, in 500 eyes, found that the corneal, corresponded exactly with the total, astigmatism in only 6 per cent. In about 20 per cent. the amount was almost exactly the same; in 60 per cent. the difference was not over 0.5 D.; in

52 per cent. the direction of the meridian corresponded exactly, and in 80 per cent. within fifteen degrees.

As to variations in astigmatism from time to time, it must be recognized that these do occur. They might be expected in progressive myopia, but they occur with the hyperopic astigmatism as well. My attention was first called to this in my own case where the astigmatism has increased from 0.05 D. to 1.75 D. Some years ago I published seventeen cases that I had been able to follow from year to year, with determination under mydriatics.

[*This report will be continued in the next issue.—Ed.*]

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY OF THE BRITISH MEDICAL ASSOCIATION, BRISTOL MEETING, 1894.

[*Report continued from page 177, current volume.*]

DIAGNOSIS OF THE PARALYSES OF OCULAR MUSCLES.

By Dr. E. LANDOLT, of Paris.

He thought that the diagnosis could be made with comparative ease and gave his method of examination: First he used the red glass and thus determined whether the diplopia was homonomous or heteronomous. Second, by moving a light, held a short distance in front of the patient, he determines in which direction the diplopia exists, and thus he can readily tell which muscle is at fault. In the third place he stated that the position in which a patient held his head frequently indicated the muscle that was at fault.

THE MAINTENANCE OF EQUAL ROTATION OF THE EYES AFTER OPERATIONS ON THE OCULAR MUSCLES.

By GEORGE T. STEVENS, M. D., New York.

In this paper Dr. Stevens presented his views as to the proper method of operating on the eye muscles, always dividing the operative effect between the corresponding muscles of the two eyes. He does this whether the indications are for tenotomies or advancements. He taught that a complete tenotomy should never be done in operating for any form of heterophoria; and said that such a procedure was rarely admisable even in cases of strabismus.

The next paper being on a kindred subject was read, its title being

EXPERIMENTAL INVESTIGATIONS OF EYE MOVEMENTS.

By Dr. J. S. R. RUSSELL, M.B.

The first series of experiments set forth were made by irritating the cortex; the second series were made on the cerebellum.

DISCUSSION

Of the papers read by Drs. Landolt and Stevens and Mr. Russell then followed.

Mr. Snell showed some photographs of patients who had one form or another of ocular paralysis, the position of the head indicating with a high degree of accuracy the affected muscle. He resorted to various tests, however, in arriving at his conclusions.

Dr. Savage (on Dr. Landolt's paper) said, that in teaching his classes during the last three years, he had resorted to a very simple procedure in determining which one of the recti muscles has paralysis. Holding a lighted candle in the median plane it may be seen as one. Moving it to the patient's right, diplopia results. The affected muscle is on the same side of the eye to which it belongs as is the double candle; therefore it must be the internal rectus of the left or the external rectus of the right eye, and the affected eye sees the candle that is farthest removed. Exclusion of one eye or the other quickly settles the question.

Suppose that it is one of the vertical muscles that is affected: we begin the test in the horizontal plane. If moving the candle up develops diplopia it is a superior rectus that is diseased, and it belongs to the eye that sees the higher candle.

Dr. Savage (on Dr. Stevens' paper): As to the etiology of internal squint, I will say that I believe that Donders was not wholly wrong when he taught that hypermetropia was the cause. While I do not believe that hypermetropia alone can cause squint, I do believe that it is one of the causative factors in most cases. The impulse that must come to the ciliary muscles of hypermetropes is always attended by a corresponding impulse to the internal recti, developing what I termed a pseudo-esophoria, in a paper published more than a year ago. The chief factor in the production of internal squint is intrinsic esophoria. Neither one of these conditions existing alone might be able to develop a squint, but the one grafted on to the other may do so; hence an indication for treatment.

Another factor that may cause squint in esophoric cases is hyperphoria, as clearly set forth by Dr. Stevens in his paper.

While other factors might be mentioned, I think I am right when I say that the three great factors entering into the causation of internal squint are, pseudo-esophoria (caused by hypermetropia), intrinsic esophoria and hyperphoria, and that the greatest of the three is intrinsic esophoria.

In the treatment of internal squint the first thing to do always is the correction of the hypermetropia which takes away the pseudo-esophoric factor. If the patient is young, this alone will often result in a correction of the squint, although the intrinsic esophoria has not been altered. Likewise an operation for the cure of the hyperphoric condition will relieve the squint though the intrinsic esophoria remains.

In older cases I know the interni must be operated on, and in some cases the externi as well. I fully agree with Dr. Stevens that the operative effect should be divided between the corresponding muscles.

Mr. Wray presented a diagram of his own device by means of which he could easily detect whether the superior rectus or superior oblique is paralysed, likewise the inferior rectus or inferior oblique.

Mr. Doyne said that heterophoria greatly complicated any study of paralyses of the ocular muscles.

Dr. J. L. Thompson said that the patient, to prevent diplopia, instinctively closes the affected eye. This thus readily determined, the finding of the affected muscles was easy in most cases. In cases of internal squint he advocated the early correction of the hypermetropia, stating that, in his practice, many squinting eyes had thereby been straightened. He had put spectacles on squinting children at as early an age as three or four years. These cases taken early can be cured, while good results rarely ever follow in old and bad cases whatever may be done for them.

Mr. Tasswill said that in operating for squint he rarely ever got binocular single vision, and asked for the experience of others on this point.

Mr. C. H. Walker said it was easy to make a diagnosis of paralysis of the ocular muscles, and referred to, but did not describe, his method of procedure.

Dr. Risley said that anisometropia is so commonly found in cases of squint, he thought it must act as a causative agent. Whatever else is done for the cure of squint the focal error should be corrected.

Mr. Cross said that sometimes, in ocular paralysis, the patient selects the faulty eye for progression. In discussing Dr. Stevens' paper, he said that while some of us think that Dr. Stevens goes too far in his study of heterophoria, yet we all know that he has done great and lasting good. He (Cross) has never operated on a case of heterophoria. He believes that anisometropia bears a causative relationship to squint. The squinting muscle is too short, and the opposing muscle is too long, hence both of these muscles should be operated on (the one tenotomized and the other advanced) before going to the other eye.

Dr. Landolt said that strabismus is always a binocular trouble and therefore both eyes should be operated on so as to equalize the tension of the corresponding muscles. He opposed tenotomies and favored advancements.

Dr. Stevens commended Dr. Landolt's paper on the determination of paralysis of the ocular muscles, and then gave his own rule for distinguishing paralysis of the obliques from the same affection of the superior and inferior recti [see page 31, No. 1 vol. iv. of this journal]. He commended Mr. Russell's experimental investigations of the action of the ocular muscles. He astonished the greater part of his auditors by stating that he had never seen a single case of internal squint cured by the correction of hypermetropia. He did not believe that hypermetropia bears any causative relation to squint. As to the correction of squint, he stated that it was a most difficult procedure: that the operation should be done step by step, and that the aim should always be the production of binocular single vision. The cases of antipathy to binocular single vision always demand operation on the superior rectus of one eye, and sometimes the inferior rectus of the other eye. Often, in operating for squint, as the tension of one set of muscles is relieved another set takes on tension.

The next paper on the programme was

ON THE GOOD EFFECTS OF DRESSING ONE EYE ONLY AFTER CATARACT EXTRACTION.

By J. J. CHISOLM, M.D.

This paper has already been published in full in No. 3, Vol. iv. of this journal, page 108.

The next paper was on

OBSERVATIONS ON SOME PHASES OF OPACITY AND LUXATION OF THE CRYSTALLINE LENS.

By J. L. THOMPSON, M.D.

In this paper he gave the history of some very interesting cases. First, he referred to cases of segmental lenticular opacities which occur downward and inward. When he first observed these cases he always told his patients that they had beginning cataract, and shortly they would be blind, and would have to be operated upon. Experience taught him that, in the majority of these cases, these opacities did not extend to pupillary space but remained local, not interfering with vision. Finding such a case, he has now long been accustomed to make drawings in his case-book, so that, year after year, he might make comparisons. This period of careful study of these opacities has now covered twenty-two years, and has convinced him that such patients are not likely to become blind by involvement of the whole lens. The youngest person thus observed was forty, the oldest eighty-seven years. Usually it was in both eyes. These opacities, once in fifty, occur down and out. When they occur in upper part of lens the prognosis is not so favorable. He presented no theory as to the cause of these local, stationary opacities.

He also described a circular peripheral opacity of lens, which he said is not always senile, as he had once seen it at the age of twenty-three, and often as early as thirty-five years. This, too, is not likely to involve the center of lens. He then reported some interesting cases of ectopia lentis, congenital and acquired.

The next paper presented discussed

THE DIAGNOSIS OF THE CONTAGIOUS FORMS OF OPHTHALMIA, VIZ.: THE PURULENT, THE CATARRHAL, AND THE GRANULAR VARIETIES.

By HENRY JULER, F.R.C.S.

Mr. Juler, in commencing his paper, regretted the imperfect knowledge with regard to the specific cause of these complaints, stating that we could, in many instances, only rely upon a diagnosis by the clinical features of the case.

He discussed these diseases under two heads: the acute forms of ophthalmia and the chronic.

In the three common acute varieties, the purulent, the catarrhal, and the granular, many symptoms are similar, for example, the discharge may be purulent in all three kinds. He points out, however, that we are able to distinguish the gonorrheal variety by the presence of the gonococcus of Neisser. The intensity of the symptoms with brawny infiltration of the eyelids, are also more common in this complaint. Acute granular ophthalmia is to be recognized if the "sago-grain" granulations are seen on the palpebral conjunctiva. Their absence, however, is not sufficiently trustworthy to exclude the disease, owing to their existence, in many cases, being masked by the inflammatory infiltration. It usually subsides into a chronic condition. Acute catarrhal ophthalmia, though frequently severe, and oftentimes attended with excessive discharge, conjunctival hemorrhages, and occasioning great discomfort, besides being most contagious, readily subsides under appropriate treatment in about fourteen days. Though the existence of an organism has been proved, more evidence is wanting to show that it is the specific cause of this disease.

Mr. Juler considered that most cases of chronic conjunctivitis came under two headings: the chronic catarrhal and the chronic granular; in other words, a simple and a specific form. He entered into the question of the value of lymphoid follicles or so-called "trachoma bodies," as helping in the diagnosis of these two complaints. He is of opinion that lymphoid follicles existed normally in most cases, having their anatomical site in the cul-de-sac, and that they are, as it were, sentinels which give warning at the approach of foreign or irritating substances, and endeavored to eliminate them if they entered the tissue, consequently were very prone to suffer inflammation, either simple or specific. He believes that only in trachoma are follicles to be found in abnormal situations as on the palpebral conjunctiva or even in the cornea. He showed photomicrographs of these bodies and other histological changes in this membrane associated with these diseases. one of which illustrated a follicle imbedded in the substantia propria of the cornea in a case in which a progressive pannus had completely disorganized that tissue. So-called "follicular conjunctivitis" he regarded as a simple non-contagious inflammation, allied to chronic catarrhal conjunctivitis, but possessing besides, hyperplastic changes in the normally existing follicles.

He emphasized in conclusion, the difficulty of distinguishing between certain cases and pointed out that their behaviour to treatment is very often the only way of arriving at a diagnosis.

[*This report will be continued in the next issue.—Ed.*]

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If you want a location in a good city, in one of the Southern states (not Tenn.), see page vii of this issue. In this connection, let me ask you to look at all the advertisements in the RECORD, about which special mention will be made in the next issue.

Ophthalmic Week

In the Philadelphia Polyclinic, in November, was devoted to a study of the Ocular Muscles. We have been promised, for publication in the RECORD, a report of the work done in this important branch of eye-study, by the able teachers of ophthalmology in this progressive school for graduates.

The Pink Slip

Will be found in your copy of this issue, if you are due anything on your subscription account. The time not paid for and the amount due will be stated on the slip. You will greatly favor us by sending your personal check for the amount due, so that the treasury of the RECORD may be full enough to meet current expenses. This issue completes the first half of volume iv.

1894

Will have ended before the appearance of the next number, therefore we let this issue bear to all the readers of the RECORD our best wishes for a merry Christmas and a glad New Year. May we indulge the hope that the friends of the RECORD in this, and in other countries, will give to it the same kind support, literary and financial, in the future, that they have accorded it in the past.

Eight International Ohhthalmological Congress.

This meeting which was held in Edinburgh, August 7-11 last, was not as largely attended as might have been expected, there being only 170 present. The meeting, however, was one composed largely of men who have done, and are doing, good work in the field of ophthalmology, many of them known the world over. The material presented was far too abundant to receive that open and free discussion that would have been profitable; and many papers could not be read for want of time.

About one-fourth of the Congress was composed of American (U. S. A., and Canada) Oculists, many of whom are known wherever ophthalmology is taught. Yet American Ophthalmology was not accorded that place that it richly deserved. On the first day Knapp only was permitted to appear; on the second no paper by an American was presented; on the third day Burnett was accorded a place on the programme; on the fourth day, as if to atone for neglect, or, possibly, that the best might appear last, a large part of the programme was given to Americans in the following order: Theobold, Savage, Risley, Stevens and Gould; but even then the programme was broken by the introduction of one or two who were not down on the card for that day. This complaint (if a true statement can be called a complaint) is not made because the writer did not receive due consideration, for although he came on the last day he had a good audience, and could have occupied his full time had he chosen to do so (in deference to his colleagues to follow him, he ended his remarks in eight minutes). The first hour of every session was devoted to demonstrations. The Americans participating in this feature of the work were: Clark, Risley, Noyes and Ayres.

The papers presented were, as a rule, of a high order of merit, and the discussions were spirited. We have succeeded in securing the services of Dr. A. A. Hubbell, Buffalo, to report the entire proceedings, and that insures that the readers of the Record will have profitable reading. We had thought that this work would devolve on us, but we most gladly transfer the duty to the hands of our able friend, Hubbell. Look for the first part of the report in the next issue.

THE
OPHTHALMIC RECORD.

VOL. IV. JANUARY, 1895. No. 7.

THE EIGHTH PERIODICAL INTERNATIONAL OPHTHALMOLOGICAL CONGRESS HELD AT EDINBURGH, AUGUST 7-11, 1894.*

By ALVIN A. HUBBELL, M D., Buffalo, N. Y.

HISTORICAL INTRODUCTION.

Ophthalmology was the earliest to become distinctively a special dapartment of medicine, being at first degraded by charlatanism and quackery, but afterwards elevated to its proper position by scientific study and practice; was first to put forth its separate treatises; was first to organize special hospitals; was first to publish special periodical literature; was first to occupy special chairs in medical schools, and was first to establish an international congress.

In 1838, Florent Cunier, of Brussels, Belgium, founded the *Annales d' Oculistique*, the first exclusively ophthalmological journal ever published, and through it an interest was awakened and an influence extended which did more than all else combined to secure for ophthalmology scientific treatment, and professional recognition and respect. The maintenance of this journal was an arduous task, but it was successful. In 1853, it was transferred to other hands, in consequence of the early death, in April of that year, of its learned founder and editor.

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*With the consent of the author and the editor and publisher, this is republished from the Buffalo Medical and Surgical Journal.

Those who then assumed management were Dr. Louis S. Fallot, of Brussels; Dr. J. Bosch, of Gand; Dr. F. Hairion, of Louvaine; Dr. J. VanRoosbroeck, of Gand, and Dr. E. Warlomont, of Brussels, the latter being made the editor-in-chief. It was this editorial committee, which, following the example of the lamented Cunier in the consecration of its efforts to the scientific advancement of ophthalmology, conceived the idea of calling together from all parts of the civilized world as many as possible who were exclusively, or otherwise closely, identified with this branch of medicine. Without doubt, Dr. Warlomont was the moving spirit in this project, but the whole editorial staff constituted itself a committee of organization, with Dr. Fallot, president, and Dr. Warlomont, secretary-general. In a note to the readers of the *Annales d' Oculistique*, January, 1857, the editorial committee made the following statement:

"The study of ophthalmology continues to extend; some men of most eminent merit are consecrating to it their time and labors. That which we have formerly predicted, and that for which we have wroked with all our heart, is accomplished to-day. Besides, ophthalmology has progressed, and it has become specialized. Look at Germany, at England, where it is cultivated with so much ardor and success, and see physicians of greatest renown devoting themselves exclusively to it. We know, and have many times repeated, that from a scientific point of view, ophthalmology cannot be isolated from other branches of the healing art; it receives from them and furnishes to them by a just reciprocity most important information. It is not so in regard to the technical part; here it has its proper domain, its means of diagnosis, its operative manipulations, its instruments and apparatus, and it is not too much for any one life to explore, to search into and to make productive.

"It is under the domination of this thought that the editorial committee of these *Annales* has conceived the project of calling together at Brussels, in the month of September next, in a special congress, men who cultivate ophthalmology, and those who, without specially cultivating it, are interested in it and understand its importance."

This committee sent out its first circular, dated January 15, 1857. Pursuant to this call and announcement, ophthalmologists and physicians interested in ophthalmology to the number of 250 convened at Brussels, September 13-16, 1857, and the "Periodic International Ophthalmological Congress" was inaugurated.

To detail the program that was carried out, to describe the enthusiasm that was aroused in the discussions of the assigned questions, and to note the interest manifested in the ophthalmoscope which had so recently (1851) been discovered by Helmholtz and had so wonderfully opened up new fields of exploration, would be foreign to the purposes of this communication. But something of the *personnel* of this first international ophthalmological congress, and, indeed, so far as I can learn, the first international congress of medicine or any of its branches, may be *apropos*.

While Dr. E. Warlomont was undoubtedly the "father" of the congress, Dr. Fallot was made its president. Dr. Warlomont was elected secretary-general, and as in its preliminary organization, so here he was the most energetic and the most efficient of any in its management. Dr. Fallot was an older man, not exclusively an ophthalmologist, but a most distinguished physician of Belgium, and was worthy of the highest honors of the congress, particularly in view of his coöperation in its organization. Warlomont was a young man, and by his ability and zeal was eminently fitted to perform the duties incumbent upon this office. The success of any society, association or congress depends largely upon its secretary. If he has the proper ability and energy, it will be a success always. Warlomont was the right man here, and this congress was a success, even under much opposition and reproach, and it greatly helped to win for ophthalmology, as a specialty, an honorable recognition that has continued to increase to the present time. Thirty countries, or governments, were represented. Among the members from our own country were Dr. S. D. Gross, Dr. Isaac Hays, Dr. Lazarus and Dr. Little, all of Philadelphia; from Great Britain, among others, were Bowman, Dixon, Streatfield, Critchett, Mackenzie and Walton; from Austria, Arlt, Ed. Jæger, Stellwag; from Denmark, Hansen (now Hansen-Grut), Thüne; from Hanover, Max Langenbeck, the two Stromeyers; from Holland, Bauduin, Donders; from Italy, Quaglino, Gioppi, Quadri; from France, Cusco, Desmarres, Guélpin, Sichel, Stœber; from Germany, Juengken, Langenbeck, Von Graefe, etc., etc. These distinguished men and many more honored this first congress by their presence, and enriched its transactions by their communications. But where are they to-day? Scarcely any live to tell the story of that time. Most of them have gone to their reward, and "their works do follow them," and in many instances these have immortalized them. But they have transmitted to us the heritage of this organization which it is ours to enjoy, and which should be preserved immaculate and continued true to its original purpose.

Eight sessions of the International Ophthalmological Congress have now been held, as follows: the first at Brussels, September 13-16, 1857, under the presidency of Dr. L. S. Fallot, of Brussels; the second at Paris, September 30 and October 1-3, 1862, Dr. J. F. Vleminckx, of Brussels, president, and Dr. Jules Sichel, of Paris, perpetual honorary president; the third at Paris, August 12-14, 1867, Dr. Albrecht von Graefe, of Berlin, president; the forth at London, August 1-3, 1872, Dr. F. C. Donders, of Utrecht, president; the fifth at New York, September 12-14, 1876, Dr. E. Williams, of Cincinnati, president; the sixth at Milan, September 1-4, 1880, Dr. Quaglino, of Milan, president; the seventh at Heidelberg, August 8-11, 1888, Dr. F. C. Donders, of Utrecht, president, for the second time; the eighth at Edinburgh, August 7-11, 1894, Dr. D. Argyll-Robertson, president. Each of these sessions has borne rich fruits, each has had a distinguished membership, each has been promotive of scientific research, and each has fostered that spirit of fraternity and good-will which extends far beyond town, city or country, and becomes truly international.

THE EIGHTH CONGRESS.

The eight session of the congress, so recently held in Edinburgh, in whose proceedings it was my happy privilege to join, was common with the others in having a membership which included many of the most eminent ophthalmologists of the world and in presenting a program which included papers of the highest scientific rank. To be sure, none of the former presidents were there; indeed, they all live only in their works and the memories of those who knew them. Very many others who were active in other sessions and contributed so generously and acceptably had either been laid to rest or were stricken with disease and were giving their lives back to the Great Source of all life, as in the case of the revered and immortal Helmholtz, or were called elsewhere by various attractions and duties, and they were not there. They were missed. Professor Hansen-Grut, of Copenhagen, was the only one present who was a member of the first congress, in 1857. The themes and questions which so aroused the enthusiasm, and so stimulated the thought and discussion of other meetings, were not introduced at this time. But there were new faces to take the place of old ones, and the subjects here discussed were as alive as those that made up the old programs, and its work was entered into with that zeal, and was possessed of that high scientific character which marked former meetings. While, therefore, the older generation of ophthalmologists is passing away, the newer is taking its place, and thus the vitality of the congress is preserved and its purposes continued.

Among the members of former congresses we saw the venerable Prof. Carlo Reymond, of Turin, and Dr. Zehender, of Munich. Then there were also Chibret, of Clermont-Ferrand; Deutschmann, of Hamburg; Holtenhoff, of Geneva; Hansen-Grut, of Copenhagen; Hirschberg, of Berlin; Th. Leber, of Heidelberg; Meyer, Landolt and Bull, of Paris; Priestly Smith, of Birmingham; Pfluger, of Berne; Sattler, of Leipzig; Schmidt-Rimpler, of Gottingen; Snellen, of Utrecht; Power, McHardy and A. Critchett, of London; Swanzy, of Dublin; and from our own country, Noyes, Knapp and Roosa, of New York, and Green, of St. Louis. To this list of men, so well known throughout the world, I might add others, but I mention these to show how truly the old membership, is brought forward to the new, the one to be assimilated with the other to preserve the organic individuality of the past.

The membership of the Edinburgh congress compared in numbers most favorably with that of other sessions. The number of members was 290, but the actual attendance, as shown by the registry on the afternoon of the last day, was about 170. The number listed from America, including Canada, was 69, of whom 32 from the United States, and 5 from Canada were in actual attendance.

This session was held in Edinburgh, pursuant to an invitation extended by Dr. Argyll-Robertson, of that city, at the Heidelberg meeting, in 1888. The committee of organization was formed principally of a few Edinburgh physicians, with Dr. Argyll-Robertson, president, and Dr. George A. Berry, general-secretary. This committee received the coöperation of the medical profession and many of the citizens of Edinburgh in perfecting plans for receiving and entertaining the gentlemen who might attend the congress, together with the ladies who might accompany them.

The renowned University of Edinburgh, with its medical school made equally famous by the long array of distinguished men who have honored it from its inception, in 1724, to the present time, opened wide its doors and tendered its memorable halls to the occupancy of the congress.

Fortified by such local support, the committee proceeded, early in 1894, to issue the call for the meeting, and invited contributions from men in all parts of the civilized world. From 9 to 1 each day, August 7-11, the congress was to devote itself to scientific work, and the balance of each day was to be given to entertainments of various kinds. In the latter, the committee commanded numerous resources and offered a "bill of fare" such as could not be provided by any other city but Edinburgh, possessed as it is of unexcelled beauties; interesting as it is in the annals of history; rich as it is in the numerous monuments, standing or crumbling, marking the struggles, the defeats, the despairs, the victories and the securities of a hardy and courageous people; distinguished as it is as a great seat of learning and as a center of medical thought and culture, made lustrous, by the Monros, Cullen, Gregory, Syme, Goodsir, Bennet, Christison, Simpson, Gairdner and many others; and surrounded as it is by a great number of places and objects that poets and historians have made famous by song and pen. With attractions like these, who could decline the invitation to "come?"

OPENING OF THE CONGRESS.

The congress was opened Tuesday morning, August 7th, in the physiological department of Edinburgh University. On the nomination by Dr. Berry, of Edinburgh, Dr. Argyll-Robertson was elected president of the congress. On taking the chair he bade the members, on behalf of the committee, a hearty welcome to the ancient capital of Scotland. He pointed out how much the city owed to its beauty of situation and to its historical associations. In particular, it was interesting to members as a seat of a university that had long been famous for the eminence of its medical school. Thirty-seven years had now elapsed since the first international ophthalmological congress, and they might pride themselves on being among the first to institute such meetings. Many changes had occurred in their ranks since the first meeting in 1857, and even since the last meeting at Heidelberg in 1888. They had to deplore the loss of two members who took the most prominent part in it—Prof. Donders and Prof. Becker, the former supreme in the domain of physiological optics, the latter the oculist to whom science was in particular indebted for his able investigations into the anatomy and pathology of the crystalline lens. He could not omit reference to one other misfortune which they had to deplore. At the last congress they rejoiced in one of the greatest, if not the greatest, physicist of the day, and one to whom ophthalmology was deeply indebted for the great progress it had made in recent times. Helmholtz was there, deeply interested in their work, and giving them the advantage of his coöperation. Who was there that was present on that occasion, that did not recall with affection and reverence the frank, simple and manly countenance of him to whom they owed the ophthalmoscope and whose genius had ranked him among the foremost of scientific men? Only the other day they were saddened with the news that their revered master was ill, stricken with paralysis. He was sure they all deeply sympathized with him in his affliction and prayed for a rapid recovery from his serious illness. The president congratulated those present upon the flourishing prospects of the congress. At the last meeting he said the propriety of continuing to hold an international ophthalmological congress was considered worthy of discussion by the president, Dr. Donders. The decision arrived at, was that these meetings should not be discontinued, and it was to him a source of great satisfaction. This congress showed no signs of decline; it retained its full vigor and vitality. It was no weak, puny shoot of what might be viewed as a parent trunk, dependent upon it for its very existence; but it was a sturdy, vigorous, independent plant, full of the sap of vigor and life. They would prove traitors to their noble leaders, Von Graefe, Donders and Bowman, were they to allow the institution they were so deeply interested in to die. Might the international ophthalmological congress ever flourish, and might each successive meeting be more prosperous than the preceding one.

On motion of the president, Mr. Power, of London, and Mr. Swanzy, of Doublin, were elected vice-presidents of the congress; Dr. Geo. A. Berry, of Edinburgh, was elected secretary-general; Dr. Parent, of Paris, Dr. C. Hess, of Leipzig, and Dr. Fergus, of Glasgow, assistant secretaries. The following honorary presidents were elected: Prof. Panas, Dr. Meyer and Dr. Landolt, of Paris; Prof. Zehender, of Munich; Prof Leber, of Heidelberg; Prof. Hansen-Grut, of Copenhagen; Prof. Reymond, of Turin; Prof. Snellen. of Utrecht; Dr. St. John Roosa and Prof. Knapp, of New York; Mr. Chritchett, of London; Mr. Priestly Smith, of Birmingham; Dr. Little, of Manchester; Dr. Pridgin Teale, of Leeds, and Dr. Reid, of Glasgow.

The Lord Provost, Sir James Russell, was then introduced, and said it was a great pleasure to be present on that occasion and to extend to the congress a right hearty welcome to the ancient city of Edinburgh. He referred to Edinburgh as a favorite meeting-place for various bodies and a city largely interested in medicine. They had a university and medical school of which they were proud, a university which, unlike other Scottish universities, did not owe its origin to ecclesiastics or to the church. It was founded more than three hundred years ago by the king of Scotland and by the town council of the city, and the town council has ever since had the warmest interest in its prosperity. They were, therefore, probably more than any other town in the kingdom, deeply interested in the progress of medicine, and had a greater appreciation, and had a possibly greater knowledge of the men who were engaged in its practice, and they felt that in welcoming this congress they were welcoming those who ought to be and were their friends.

The president then said he was sure they had all listened with pleasure to the Lord Provost and appreciated his kindness in welcoming this congress. Perhaps they were not all aware that it was a very unusual circumstance in Edinburgh for a member of their own profession to hold the responsible office of the Lord Provost, and on that account, and also on account of the interest he had manifested, he asked the congress to confer upon his lordship an honor which was unusual and in their case unique, that was, to make him an honorary member of the Edinburgh congress. This was done.

The congress was then declared open for scientific work, and during the sitting of four days fifty communications were presented, as follows:

FIRST DAY, TUESDAY, AUGUST 7TH.

1. On the subconjunctival treatment of operative and traumatic wounds of the cornea, by DR. SNELLEN, of Utrecht.
2. Remarks on cataract extraction, based on a recent series of 600 successive cases, by DR. KNAPP, of New York.
3. Scleral puncture as an adjunct to iridectomy in the treatment of glaucoma, by MR. PRIESTLY SMITH, of Birmingham.
4. Injuries of the eyes caused by pieces of copper or brass, by DR. LEBER, Heidelberg.
5. Traumatic paralysis of the motor nerves, by DR. PANAS, of Paris.
6. (*a.*) A new operation for ptosis. (*b.*) Treatment for the immediate cure of corneal ulcers, by DR. MULES, of Bowdon, Cheshire.
7. Drainage of the eye, by DR. PFLUGER, of Bern.

8. Method of relieving tension in chronic glaucoma, by MR. WALKER, of Liverpool.

SECOND DAY, WEDNESDAY, AUGUST 8TH.

DEMONSTRATIONS.

9. Albuminuric retinitis, by DR. DIMMER, of Vienna.

10. Contribution to the anatomy and physiology of the iris, by MR. JULER, of London.

11. The histological changes which accompany the healing of perforating wounds of the sclerotic, by DR. FRANKE, of Hamburg.

12. Orbital cyst with microphthalmus, by DR. LAPERSONNE of Lille.

13. Exhibition of aseptic collyria, aseptic case for dressings and a new skiascope, by DR. DARIER, of Paris.

14. Alteration in the cells of visual centers produced by exposure of the eyes to light, by DR. GUSTAV MANN, of Edinburgh.

PAPERS.

15. Chorio-retinitis—clinical varieties, etiology, treatment, by DR. ABADIE, of Paris.

16. Changes in the macula associated with retinal inflammation and edema, by MR. GUNN, of London.

17. Recurrent, temporary, visual obscurations with ophthalmoscopic appearances observed during the obscurations, by DR. BENSON, of Dublin.

18. Retro-choroidal hemorrhages after operations on the eye, by DR. DUFOUR, of Lausanne.

19. Mechanism of accommodation, by DR. TSCHERNING, of Paris.

20. Treatment of ocular diphtheria by crude petroleum, by DR. VIAN, of Toulon.

21. Effect produced by the pressure of the lids upon the cornea, by DR. BULL, of Paris.

22. Optic neuritis of tonsillary reflex origin, by DR. MENACHO, of Barcelona.

THIRD DAY, THURSDAY, AUGUST 9TH.

DEMONSTRATIONS.

23. New method of hardening eye-preparations by formol, by DR. LEBER, of Heidelberg.

24. Ulcers of the cornea produced by staphylococci, by DR. BACH, of Würzberg.

25. Structure of the ganglion cells of the retina, by DR. BACH, of Würzberg.

26. Nature of Schlemm's canal, by DR. GUTMANN, of Berlin.

27. Two cases of serous cyst of the iris, by DR. CLARK, of Columbus, Ohio.

PAPERS.

28. Operations for strabismus (strabotomy), by DR. LANDOLT, of Paris.

29. Relative value of mercury and iodide of potassium in the treatment of ocular syphilis, by DR. CHIBERT, of Clermont-Ferrand.

30. The best way of using mercury in ocular therapeutics, by DR. DARIER, of Paris.

31. Correction of high degrees of myopia by removal of the crystalline lens, by DR. THIER, of Aix-la Chapelle.

32. Indications for removal of the crystalline lens in high myopia, by DR. FUKALA, of Pilsen.

33. Operation for occlusion of the pupil in aphakia, by DR. NOYES, of New York.

34. Anatomy of the ciliary ganglion, by DR. MICHEL, of Würzberg.

35. New metric or dioptral system of measuring and designating prisms, by DR. BURNETT, of Washington.

36. Treatment of certain forms of optic-nerve atrophy by antipyrin, by DR. VALUDE, of Paris.

FOURTH DAY, FRIDAY, AUGUST 10TH.

DEMONSTRATIONS.

37. Illustrations of leprous diseases of the eye, by DR. BORTHEN, of Drontheim.

38. Apparatus for skiascopy, by DR. RISLEY, of Philadelphia.

39. Granulation and chalazion forceps, by DR. AYRES, of Cincinnati.

40. Case of lymphoma of the four eyelids cured by internal use of arsenic, by MR. BRONNER, of Bradford.

PAPERS.

41. Maturation of senile cataract by preliminary iridectomy with trituration of the lens, by MR. MCHARDY, of London.

42. Sympathetic opthalmia after sarcoma of the choroid, by DR. NIEDEN, of Bochum.

43. Radical cure of strictures of the nasal duct, by DR. THEOBOLD, of Baltimore.

44. Treatment of congenital hydrophthalmia, by DR. STŒLTING, of Hanover.

45. Treatment of conjunctival granulations by electrolysis, by DR. MALGAT, of Nice.

46. Associated paralysis of movements of the eyes upwards, downwards and for convergence, by DR. SAUVINEAU, of Paris.

47. Operative cure of persistent tabetic opthalmoplegia, by DR. CHEVALLEREAU, of Paris.

48. Oblique astigmatism and the oblique muscles, by DR. SAVAGE, of Nashville, Tenn.

49. A study of abnormalities of occular balance, by DR. RISLEY, of Philadelphia.

50. The relations of the function of accommodation to that of convergence, by DR. STEVENS, of New York.

For purposes of abstract and analysis these fifty communications and the discussions which they elicited, may be grouped into those which treated of histological anatomy and physiology, pathological anatomy, etiology, particular diseases, injuries and accidents, medical therapeutics, surgical therapeutics, instruments, miscellaneous.

HISTOLOGICAL ANATOMY AND PHYSIOLOGY.

JULER (10) exhibited microscopical preparations verifying the works of Schwalbe, Treacher Collins, and others regarding the existance of a dilatator pupillæ muscle. These dilatator fibers extend in the posterior layer of the iris from the ligamentum pectinatum without, to the sphincter of the pupil within. This muscle has two actions; (1) it dilates the pupil; (2) by its action on the ligamentum pectinatum it tends to close the spaces of Fontana. Recently its presence has been established physologically by the experiments of Langley and Anderson.

MANN (14) gave an exceedingly interesting demostration purporting to show the physiological changes which take place in the cells of the visual centers of the brain through the action of light on the retina. It had been shown that the nuclei of the sympathetic nerve-cells enlarge as the result of stimulation for fifteen minutes and become shriveled after prolonged stimulation. He had made numerous preparations showing that in all cases the nuclei first enlarge, and that both cells and nuclei lose their chromatin, in part, on stimulation of fifteen minutes to five hours, but if continued nine hours, the nuclei shrivel. The same holds good for motor cells of the brain and spinal cord. Excitation of the retina by light produces the changes referred to in the cells of the optic apparatus, especially in the ganglion cells of the retina, in the cells of the external geniculate bodies, in those of the anterior corpora quadrigemina, and the cells of Ramony Cajal between the molecular and the small pyramidal layer of the lower aspect of the occipital lobes in rabbits.

BACH (25) described the minute structure of the retina and held that its ganglion cells do not have a fascicular disposition, but that they are granular and their contents nuclear.

Gutmann (26) had injected colored liquids into the canal of Schlemm in 35 cadavers, with the result of absolutely confirming the opinion of Schwalbe that a communication exists between this canal and the anterior chamber of the aqueous humor.

Michel (34) showed some excellent microscopical preparations of the ciliary ganglion, demonstrating that in its minute anatomy it resembles a sympathetic ganglion. Its cells, like those of the sympathetic, are multipolar, with axis-cylinder and other numerous prolongations. Each nerve-cell is surrounded by a fibrous investment, which is regarded as the termination of the fibers of the oculo-motor nerve. Thus the pupillary and ciliary muscles are indirectly acted upon by the oculo-motor.

Stevens (50) after a thorough investigation of the relation between accommodation and convergence has come to conclusions quite at variance with those generally accepted. He holds (1) that there is no essential relation between the two functions, the connection existing incidentally and as the result of habitual association. (2) The proportion of cases of convergent strabismus associated with hypermetropia, and divergent strabismus associated with myopia, has been exaggerated. (3) The cases of strabismus which are relieved by convex or concave sperical glasses are cases of hypertropia or hyperphoria, and the relief obtained is largely due to their action as vertical prisms. (4) His observations have led him to believe that excessive accommodation does not directly cause convergent strabismus.

Tscherning (19), in speaking of the mechanism of accommodation, said that his experiments had demonstrated that the increase of refraction of the eye during accommodation diminishes toward the periphery. At a distance from the axis of 2.5 millimeters, the accommodation is only one-half of that at the center. This is due to the fact that the anterior surface of the lens, during accommodation, becomes pointed. The same change of the lens may be produced in animals by traction on the ciliary zone.

Chibret confirmed the theory of Tscherning.

PATHOLOGICAL ANATOMY.

Dimmer (9) called attention to the fact that in albuminuric retinitis the degenerative changes were greatest in extent and intensity in the macular region, because the conditions are here the most unfavorable for the nutrition of the retina.

Franke (11) gave a most interesting and instructive demonstration, microscopically, of the mechanism by which perforating wounds of the sclera heal.

Lapersonne (12) exhibited microscopic preparations of an orbital cyst with a microphthalmic eyeball, the walls of which were a well-developed, but degenerated retina.

ETIOLOGY.

Bull (21) regarded pressure of the lids upon the cornea as an important factor in causing certain forms of occular fatigue, which he calls tarsal asthenopia, and which may be experienced by many persons on reading in bed.

Savage opposed this explanation of the asthenopia caused by reading in the recumbent posture, and referred it to the excessive work which such a position brings upon the inferior recti and superior obliques.

Burnett had found, some years ago, that pressure of the lids caused an astigmatism which he was not able to correct by any cylindrical lens, and that the changes by lid-pressure produced marked changes of the cornea-curve, as shown by the ophthalmometer.

Power cited a case in which, after a blepharoplasty, the new lid so caused increased pressure on the cornea as to produce a high degree of astigmatism.

Menacho (22) reported a case of double optic neuritis occurring in a young girl two weeks after the onset of catarrhal tonsilitis. She was totally blind and remained so for two days, when the sight promptly returned after the excision of both tonsils, and within a month she saw as well as ever. He looked upon the case as reflex in character, the reflex action passing through the glosso-pharyngeal and sympathetic nerves by way of the pharyngeal plexus.

Borthen (37) exhibited a series of photographs illustrating the effects of leprosy upon the eyes.

Nieden (42) reported a case of sympathetic opthalmia following choroidal sarcoma. The sarcoma contained cocci, both singly and in groups.

Deutschmann, in the discussion, said he had made a microscopical examination of the eyeball and optic nerve, and had found microörganisms both in the immediate neighborhood of the tumor and in the sheath of the optic nerve. He thought this would sustain the diagnosis of a "migratory" inflammation.

DISEASES.

Abadie (15) described chorio-retinitis in a clear and systematic manner. He presented very little that was new. He emphasized the disproportion which often exists between the apparent lesions as seen by the ophthalmoscope and the functional disturbances of vision, the former being prominent while the vision is nearly unaffected, in some,while in others, it is the reverse. He considered the best treatment to be hypodermic injections of bichloride of mercury and peptonate or cyanide of mercury. In rebellious forms he had found it advantageous to combine with it subconjunctival injections of one or two drops of 1 to 1000 solution of bichloride mercury. He protested earnestly against the indiscriminate use of iodide of potassium.

Deutschmann made some strictures on the paper and favored subconjunctival injections in syphilitic cases. He had also obtained good results from iodide of potassium.

Panas, while not sharing the author's opinion as to the absolute inefficiency and disastrous results of iodide of potassium, agreed with him perfectly as to the superiority of the mercurial treatment.

Gunn (16) called attention to various lines and folds which radiate from the macula in cases of edema of the retina, whether from chorio-retinitis, anemia, retinal thrombosis or other conditions. These folds often remain after the disappearance of the edema and inflammation.

Thompson, of Indianapolis, had seen many cases of the kind, but they were found, in the vast majority of cases, in young women from nineteen to thirty-five years of age.

Benson (17) reported a case of recurrent, temporary, visual obscuration in a seaman, who was a great smoker, and who had a history of malaria and acute rheumatism. He had had these attacks for four years, sometimes the obscuration being total and sometimes in a single section of the visual field, and they would last from two to five minutes. The left eye was the one generally affected. During an obscuration, the ophthalmoscope showed "total bloodlessness of part of the retina, the anemic part changing in position." He believed the attacks to be due to spasm of one or more branches of the central retinal artery.

Noyes added a case of total blindness which lasted twenty-four hours, and in which the retinal arteries were wholly empty, and the nerve extremely pale. Inhalations of nitrite of amyl relieved the condition.

Thompson thought that ophthalmic migraine might be but one remove from the condition described.

Clark (27) described two cases of cyst of the iris, one of which was congenital and the other developed without traumatism.

Bronner (40) reported a case of lymphomata of all four eyelids in a man fifty-two years of age. He saw him first in 1885, when there was found an elastic, elongated swelling of the left lower lid over which the skin was normal and freely movable. This tumor was removed and did not recur in three years. Then the four lids were found to be enlarged, and there was also a tumor of the right hard palate and the right submaxillary gland. Iodide of potassium and mercurial inunctions were ordered, but the tumors increased in size. In 1890, and 1891, Dr. Teal removed those in both lower lids. In 1891, fifteen minims of liquor arsenicalis and five minims of tincture of opium were given three times a day, and in two or three weeks all the tumors had diminished in size. As soon as the arsenic was discontinued the tumors began to increase, but disappeared again as soon as the medicine was resumed. Microscopic preparations showed the growths to be true lymphoma.

Sauvineau (46) presented a paper describing a clinical type of ocular paralysis in which there exists a paralysis of the movements of the eyes up and down and for convergence, while the movements from side to side are normally preserved. This form of paralysis, which was described by Parinaud in 1883, may begin suddenly and persist indefinitely without change. The lesions are probably seated in the supra-nuclear centers of coördination (subependymal grey substance of the quadrigeminal bodies). He had proved in 1892, that a lesion here produces paralysis of different associated and conjugate movements of the eyes, constituting a variety of ophthalmoplegia—supra-nuclear ophthalmoplegia. These paralyses are, therefore, always binocular. The diplopia, which is frequently present, and which when it exists offers nothing characteristic, has only a secondary importance in these forms of central paralysis.

Risley (49) read a most interesting paper giving the results of extended observation and study of ocular inequilibrium. He said there were two groups of anomalies of ocular equilibrium: Congenital anomalies of the eyes, and anomalies of the muscular apparatus. He desired to call attention only to the group in which single vision is maintained by a constant tension of the eye which suffers from the anomaly. In most cases the correction requisite for the relative insufficiency should be effected gradually and progressively, and in such a manner that the patient in the meantime learns to use his convergence. In absolute insufficiency the only remedy is tenotomy, or muscular advancement.

[*To be continued.*]

THE SPHERO-TORIC LENS IN ASTIGMATIC APHAKIA.

By CHARLES F. PRENTICE, New York.

In a treatise on Ophthalmic Lenses * mention is made of refraction by an asymmetrical surface, now more generally known as a toric surface—that is, a surface having two curves of different radii at right angles to each other, the same as that of a regular astigmatic cornea.

A lens having such a surface is known as a toric lens, and has been used in some instances to correct astigmatism

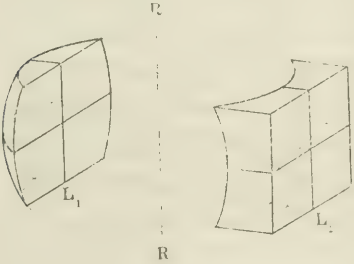

FIG. 1.

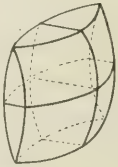

FIG. 2.

In Figure 1, L represents a plano-convex, and L_2, a plano-concave toric lens. Figure 2 represents a sphero-toric lens with the toric surface in front, and the spherical surface behind. The object of this paper is to show the advantages which the sphero-toric lens possesses over the sphero-cylindrical lens in correcting cases of astigmatism after cataract extraction.

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*A Treatise on Ophthalmic Lenses, by Charles F. Prentice, published by James Prentice & Son, 178 Broadway, New York. 1886.

In examining the refraction in Aphakia it is customary, as in other cases, to place the spherical lens in the groove of the trial-frame near the eye, with the cylinder in front. For example, in a case involving

+ 9D. sph. ⊃ + 3.5 cyl. ax. 160°,

the result is obtained by placing a bi-convex spherical lens of +9D. in the trial-frame behind the cylinder +3.5.

The optician, however, carries out this prescription *literally*, by grinding the lens with +9D. spherical on one side, with the +3.5 cylinder on the other, thereby substituting a *plano-convex* spherical element for the bi-convex one used in the oculist's examination. Furthermore, in mounting the lens, he places the spherical surface farthest from the eye, with the cylinder inside, so that the spectacles are worn with the surfaces of the lens *reversed* in respect to their positions before the eye in the trial-frame.

It is, therefore, obvious that the serious error is committed of substituting a lens which involves a change in the position of the "nodal points" of the entire refracting system, thus to a degree impairing the visual acuity obtained by the spectacles, as compared with that secured by the test in the trial-frame. Aside from this we have, in the aforesaid sphero-cylindrical lens, the unpleasant phenomenon of internal reflection caused by the extreme bulging forward of the convex element, with its surface exposed to light coming from other directions than that of the desired central incident beam.

Every ray of light, R, Figure 3, entering the convex spherical surface in a direction coincident with its radius of curvature, will enter the lens *unrefracted*, and fall upon the inner surface of the cylinder on the other side, C.

Under favorable conditions it will be reflected from this back to the inner anterior surface of the lens, there again undergoing reflection, and so on, until it becomes dissipated within the lens as diffuse light. The dotted lines in the diagram represent the radii of curvature, dividing the angles of incidence and reflection, which are equal at the points of impact on the surfaces within the lens.

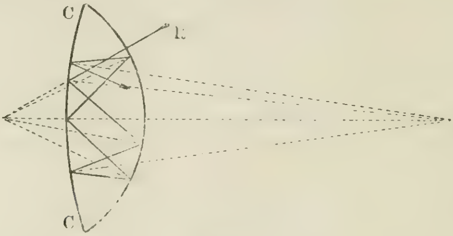

FIG. 3.

The patient wearing such spectacles is therefore compelled to look, as it were, through a self-luminous medium, which tends to interfere with the direct central incident beam of light passing through to his pupil. Again, in this form of lens the aberration is greater for all excursions of the eye where the visual axis passes through the lens at points not coinciding exactly with the optical axis of the lens.

These facts were clearly exemplified in a case which came to my notice in 1889. The lens had been made of the sphero-cylindrical form and power as above stated. The patient complained of inability to correctly judge distances in looking down, and of an annoying glare of light which he felt was within the lens itself when worn out of doors, or in a strong light. He thought if the glare could be removed he would be enabled to see better. In fact he had made the experiment of shading the lens by sighting through the partially closed hand held closely before it, and had noticed less inconvenience from the glare.

The sphero-cylindrical correction he was wearing gave him scarcely better than 6-9 of vision, whereas the test lenses in the trial frame, by my own test, gave him the somewhat unusual acuteness of 6-6.

It occured to me that the interior reflections could be avoided by constructing the lens with less curvature on the anterior surface. I therefore suggested the construction of a lens having a toric surface on the anterior side, and a spherical surface on the other, as follows: +6D. sph.⌒toric surface: +6.5 at 160° by +3 at right angles, in place of +9D. sph.⌒+3.5 cyl. 160°.

Before proceeding to consider the equivalence of these lenses, it is suggested that all thought of a simple cylindrical form should be dispelled from the mind when the toric surface is referred to. The subject will be more easily understood by dealing only with the principal refracting meridians, without regard to the other meridians of curvature giving form to the toric surface.

Referring to the lens, +9 D.⌒+3.5 cyl., it is evident that the meridian of least refraction is 9D., and the meridian of greatest refraction is 12.5 D., see m and M in the perpendicular planes of Figure 4.

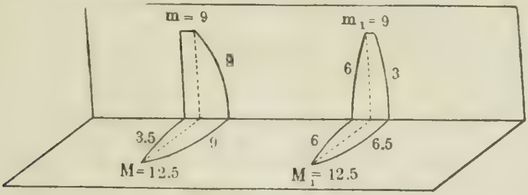

FIG. 4.

The extreme spherical curvature, 9D., on the anterior surface may be lessened to any desired degree, provided the loss of refraction is compensated for by adding it to the opposite cylindrical side of the lens, in which case the simple cylindrical surface would necessarily be *replaced* by a surface of astigmatic refraction, a toric surface, having the required focal interval of 3.5 D. To obtain such an equivalent lens of *thinnest and best form*, it is only necessary to divide the original meridian of greatest refraction, M. = 12.5D., in two parts, as nearly equal as possible, say, 6D. for the back surface, and 6.5 D. for the front surface, which, together, give 12.5 D. for the newly-created *biconvex* meridian of greatest refraction, M_1, Figure 4, in the desired equivalent lens.

Taking 6D. as the posterior spherical surface, it is necessary to combine it with 3D. on the anterior surface to secure 9D. as the meridian of least refraction, m_1, in the new lens. Consequently 6.5 D. and 3D., respectively, represent the refraction of each of the principal meridians of the anterior toric surface, which, when combined with the 6D. porterior spherical surface, will fulfil all the requirements of equivalence as shown in the diagrams.

The sphero-toric lens referred to was set in a spectacle-frame with the sphero toric surface outward, and its meridian of greatest refraction at 160°, so that the refracting elements occupied the same positions as the lenses in the trial frame.

The spectacles have been worn by the patient for the past five years with complete relief from all the disagreeable phenomena mentioned. It may also be stated that his visual acuity with the new lens is slightly better than 6-6.

For reading, the patient required +12D. sph.⊃+3.5 cyl. 160° in the trial-frame, which was given him in the form of a sphero-toric lens: +8D. sph.⊃toric surface: +7.5 at 160° by +4.

In addition to the advantages mentioned, the patient is saved the annoyance of wearing bulging lenses, which attract attention. In every instance where I have applied the sphero-toric lens, it has given entire satisfaction, though in none of the cases was the visual acuteness so perfect as in the one just cited.

The use of sphero-toric lenses is by no means confined to cases of aphakia, since equally good results can be secured by providing thinner lenses in cases of high degrees of compound myopic astigmatism, where the cylindrical corrections are comparatively weak relatively to the high spherical curvatures involved.

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY, A.M. ASSOCIATION, SAN FRANCISCO MEETING, 1894.*

(*Continued from page 230 current volume.*)

ARE LOW DEGREE LENSES OF MERELY MYTHICAL VALUE?

By H. M. STARKEY, M D., Chicago, Ill.

Under the above title the Doctor gives the results of his investigations which were incited by an editorial in *The Journal*, February 3, 1894. The editorial strongly condemned the use of weak spheres and cylinders of low degree, declaring that the advocates of their use had failed to furnish evidence that their patients had been benefited by them. To confirm or refute this statement, Dr. Starkey addressed the following letter to 100 ophthalmologists:

"*Dear Doctor:*—There appears to be much difference of opinion among ophthalmologists as to the value of low degree lenses. To assist in solving the problem will you kindly answer the following questions:

"1. Do you ever prescribe cylinders of less than 0.50 D.? or spheres of less than 0.75 D.?

"2. If No. Have you ever prescribed such lenses, and if so, what are the reasons for discontinuing them?

"3. If Yes. In what cases do you prescribe them, and what evidence have you of their value?"

We quote the following as the result of this investigation:

"Of the 100 so addressed, seventy-five, located in twenty-six States, replied. It would seem as if these replies must give some indication of the practice of ophthalmologists in general in this country. Most of those addressed were unknown to the

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*This report is taken largely from *The Journal*.

writer except by reputation, and of very few of them was the practice in regard to low degree lenses known. Under these circumstances it is hardly to be supposed that a great majority of them should have been taken from a minority of oculists. The replies received are surprising, in that they indicate that a very large proportion of oculists employ both weak cylinders and weak sphericals; a few only prescribe one but not both, any yet fewer prescribe neither. Thus we find that of the seventy-five, sixty-six replied Yes, they do use the 0.25 D. C. and the 0.50 D. S.; four reply, Yes, but seldom; three use the spheres but not the cylinders, and but two answer No, and one of those the writer of the editorial in question. Seventy do prescribe the 0.25 D. cylinders and five do not, and of the five, three prescribe the 0.50 D. sphericals.

"In answer to the second question there are replies from four; two who say that they do not now use these weak cylinders because they have no evidence of their value, but do not state if they have ever used them; one who says he has quit because he is convinced that they are useless; and one who says he rarely uses them now, because he finds that atropia either shows at least 0.50 D. of astigmatism present or none at all.

"The answers to the third question are fairly uniform, most of the answers being, in general terms, That the low degree lenses are prescribed in cases where persistent asthenopic or reflex symptoms are associated with slight errors of refraction, and the evidence of their value is the disappearance of these symptoms when the proper lenses are adjusted. A number of replies state that in many cases the symptoms remain absent so long as the lenses are worn and return at once when the lenses are omitted."

DISCUSSION.

Dr. H. I. Jones, San Francisco.—I agree with Dr. Starkey about his paper. I think a great many of these cases require weak spherical glasses. Most all of them suffer from some neurotic trouble, or some condition which can be cured by constitutional treatment. They are often bilious. Give them some blue mass or a good dose of salts and a little tonic afterwards and they will often get well without glasses, putting on colored glasses in the meantime.

Dr. Ellis.—Mr. President: Somebody has remarked quite recently in our medical literature that oculists were getting to be simply expert opticians. I think, Mr. President, our oculists should be expert opticians, but to say they are only expert opticians is to say they are very wide of the mark. There can be no question in this day and generation, when the eyes are called upon for so much work and such continuous work, that they must be under greater strain than they were in times past, and than they are in other countries where individuals are less on the move and more on enjoying themselves. I do not believe that all errors of refraction should be corrected. Many individuals pass through life with errors of refraction amounting to 1 or 2 D., either with astigmatism, or ametropia, without any discomfort and use their eyes a great deal. In the majority of cases, these are individuals in a healthy condition. There are other individuals who have only one-fourth or one-half D. astigmatism, who upon every effort of use of the eyes for close work have a reflex manifestation, frontal, vertical or occipital Where we have these conditions as the result of eye-work, I think there can be no doubt that the oculist is justified in correcting the trouble. In my own personal experience, I have had more good results from correction of astigmatism of from one-half to one-quarter D. than from greater degrees, simply from the fact that in a low degree we usually have excellent vision, and the eyes are used to the utmost capacity, whereas in greater degrees we have more or less impairment of the vision, and there is not that constant strain that there is in close work where the vision is good. I am heartily in accord with Dr Starkey in his views.

Dr. Simonton, San Jose.—Mr. President, I have corrected a great many cases of optical error of one-quarter D., and as the gentleman has just said who preceded me, it seems to me that relief is sought in the low degrees more than in the high degrees of astigmatism. In the high degree the eye gives up endeavoring to obtain perfect vision, and hence there is less eye-strain, while in the low degrees the vision being almost perfect, the eye makes every effort possible to make it perfect; hence, the trouble. As to the necessity of wearing glasses—I have not heard it mentioned, but I suppose it is your universal experience that a much larger percentage of females call for the correction of optical errors than males. In my experience, I think it will amount to three-fourths females, if not more. For some reason, there are either not the optical errors existing in the male portion of the race that there are in the female, or else they do not call for correction. Is it because they are stronger or in better condition physically? It would seem that we would have the same amount of optical error in the male portion of our race as the female, but it is my observation that a much larger percentage of females require correction. There is a great difference in individuals.

A gentleman called at my office a few days ago, who was over seventy years of age. He had inflammation of the lids in mild degree and due to eye strain in some shape. I found his glasses for short range work were + 2.00. I came to the conclusion that he was ametropic. Upon testing the individual with the letters at twenty feet, he was not ametropic. I suggested that he wear a stronger lens, as he was actually drawing on the ciliary muscle; and he has done so since. I think it would be the unanimous expression of this Section, if they would express themselves, that the low degrees of cylinder, especially quarter, are beneficial, and their use is warranted in hundreds of thousands of cases. It has been mentioned here that persons may wear glasses for a long time and then cast them off and go without. My experience in that line does not indicate that many persons will do it. After the eye has been accustomed to the glass, and the optical error has been corrected, to take off the lens and put the eye under the old conditions brings on the trouble again, except in cases where the general condition has been so improved. Our experience leads us to conclude that very few persons of optical error can cast aside their glasses and not wear them.

DR. H. B. YOUNG, of Burlington, Iowa.—My personal experience is that, in a majority of cases, ametropia disappears, so far as the ordinary tests are concerned. I want to ask the advocates of the use of one-quarter D. cylinders to tell me how they determine when they have found a case of one-quarter D. astigmatism. You must oftentimes take simply the judgment of the patient, and we know how unreliable that is. I do not believe we can *measure* it reliably by the ophthalmoscope. In my judgment, those advocating the one quarter D. cylinder, do so on the reply of the patient himself. I have found, however, that there is one way of getting a little more definite reply in regard to the one-quarter D. cylinder, but I think the cure is worse than the disease. At the meeting of the State Society in my State last year, I presented a paper on this topic, and then called attention to the fact that I doubted if any one person could take the one-quarter D. glass, and on the ordinary test card tell when a one-quarter D. had been removed. They must have a plain glass in front of them to give them the idea of looking through a glass in the first place.

I have found that in nearly every case where a one-quarter D. cylinder was accepted, astigmatism would develop in almost every case. As a result of that experience, I have nominally discontinued the use of one-quarter D. cylinders. This applies simply to those cases which have equal vision. I understand the discussion does not apply to those cases which have very marked ametropia.

Dr. Baker, San Diego.—I do not want to offer myself in opposition to the last speaker, but I would like to give my experience in this test. In testing by the use of a wheel, the radiating spokes placed at angles of ten degrees, the inequality of the wheel can be determined in a large per cent. of these cases, and the inequality corrected and the relief of strain is marked at the time. In my own case, I showed the one-quarter D. minus astigmatism, which without the use of the wheel resulted in a plus astigmatism, the use of the plus cylinder being necessary. For six or seven years of my life I have suffered from migraine of a severe type. For six or seven years previous to the wearing of the glasses, I found that by a strict diet, taking away all meats, I could be reasonably free from the attacks. I put on glasses and worked, and in the intervening time I have had four attacks of migraine, as against an attack of once a week or once a month, and these four attacks have been all I have had, notwithstanding the fact I have done as much work as I chose. The relief has been absolute, as I am thoroughly convinced, in reference to other cases. I have a number of them, and two of them were absolutely removed by having a one-quarter D. glass. Another case which had been diagnosed tubercular trouble, where there was persistent loss of weight and apparent serious lung trouble, was absolutely cured by the having of a one-quarter D. glass. I used atropin five days. I could only get the test with the wheel; I could not make it by the test card. After putting the glasses on I told the patient I was disappointed, inasmuch as there were errors which could not be corrected by glasses, and on taking the glasses off the patient immediately complained of nausea; on putting them back again the nausea disappeared. And after wearing the glasses the condition of nausea disappeared absolutely. Within a few days the case disappeared entirely and the patient gained fourteen pounds in weight, and has been absolutely well since. The eye trouble may not have been the original cause of the disturbance; this is evidenced from the fact that for the last year she has been in perfect health without her glasses. But there can be no question that the relief was immediate at the time, and that the cause was the fitting of these glasses I see no reason to doubt.

Dr. Ryan, Galesburg, Ill.—The remarks made have called into question the possibility of getting a correction by plus twenty-five sphere or cylindrical twenty-five. I have had considerable experience in fitting glasses in the last few years, and find it a very easy matter to make complete correction by the use of cylindrical twenty-five. The ordinary patient would not be able to detect any particular difference in the letters, but if you use the wheel, as has been said, you can nearly always make a complete correction. You cannot do it if the lines of the wheel are very close together, but if the wheel is very distinct, and the lines are four millimeters apart you can always do it. I have a record of cases in which I am positive that dozens of them have been fitted in that way, and the difference could be noted instantly if we changed from twenty-five to fifty, or *vice versa*. I have seen it so often that I am positive that the ordinary individual can detect those differences where we use a wheel which is clear and distinct, and the lines far enough apart so that you can easily recognize the lines. Where the lines are close together, it is in my opinion impossible, because there is a slight blur.

Dr. Price, Nashville.—I rise to add my testimony to that which has been spoken on this subject. I received a communication from Dr. Starkey and one of the cases I noted in the reply was striking. That case required only the correction of twenty-five-hundredths of astigmatism, and as with the cases related by the doctors here, it seems as if the case were too serious to be accounted for by so slight a deviation from the normal; nevertheless, the correction was given and the patient was entirely relieved.

Another case that is striking is my own. I had suffered for many years,—I was almost compelled to abandon study when quite young on account of eye trouble. I was treated at that time by various general practitioners, who treated me for all troubles and conditions from granulated lids, as they supposed I had, to a first-rate attack of conjunctivitis, and I received no relief. I went from bad to worse for about ten years, when I had my vision corrected. At that time it was an absolute impossibility for me to devote exceeding fifteen to thirty minutes to consecutive reading at night without suffering from eye-strain. After that time, and since that time, I have been able to read almost indefinitely, and what work I feel disposed to do I can do. If I confine myself to work for several hours consecutively without my glasses I feel the effect of it, but as long as I use them in proper position so as to get the benefit of the cylinder correction I proceed with my work without serious interference.

So, I am of the opinion that very frequently the great trouble lies in the fact that men presume that it is useless to make these corrections, and they do not give the patient the benefit of the correction. It is difficult to determine to the one-half D. whether they should be corrected or not, but I think by careful observation we may be able to determine it. As the gentlemen who have preceded me have said, it is almost impossible to do this by reference to the letters. We must resort to the radiating lines, and in this way we can arrive at the proper direction in nearly every case. I do not attempt to place the position of the axis by the cylinder, if that cylinder is less than seventy-five, but get the axis with a stronger cylinder and then reduce the cylinder to the required strength. As to the value of these lenses, I have every reason to have faith in them on my own account.

DR. DAVIS, Stockton, Cal.—The last speaker suggested the idea of putting a stronger cylinder before the eye to locate the angle. I want to suggest that where I could not find any effect I have reversed the cylinder. Put the cylinder in at ninety, turn it quickly and it very materially hurts the vision.

Dr. Starkey.—There have been several things brought out in the discussion, much more emphatically than I had gone over them. I should like to say, in the line of argument of the gentleman who spoke second, that more good results from low degrees of correction are found. That was expressed by the doctors in their replies—that they found in a given number of cases more cases of a low degree of error in which correction was made, than in the higher degrees. Dr. Simonton spoke of the constitutional treatment as being important, and I also dwelt somewhat upon the fact that I thought most of these cases, if they could only stop work, would get well without glasses. His experience in regard to females being in larger proportion is somewhat different from mine, probably because I have a large number of medical students who raise the proportion, so that I should think I had fully as many young men as women on my records. The fourth speaker said he thought it would be the unanimous sentiment of this Section that the low degree lenses are of great importance—that lenses were seldom omitted after being worn. That is not according to my experience. It is to be hoped in the low degrees, that when the general health improves, the ocular health will improve, and they will be able to leave them off, especially in the students and school children, and in bookkeepers who get through with their work, so that the eyes are not used so much at the end of the day. I think the statement of Dr. Young that you cannot tell within one-fourth D. was answered by others. One point you must have noticed, and it has not been alluded to, is the expression of the patient's face. How often you see the patient with that characteristic appearance of asthenopia, the corrugated brow, the scowl, and when the one-fourth D. lens is placed before the eye, at right angles, the face clears up, and the physician can tell by the expression of the patient's face that you have something beneficial; and the patient returns to the other condition if the lens is reversed. In the test for astigmatism, the test by the radiating wheel, and the reflex or shadow test were entered into quite fully. I know that persons become so expert that they can tell readily a one-fourth D. astigmatism.

[*This report will be continued in the next issue.—Ed.*]

ADENOIDS, WITH A DESCRIPTION OF NEW INSTRUMENTS FOR THEIR EXCISION.*

By ARTHUR G. HOBBS, M.D., Atlanta Ga.

A post-pharyngeal adenoid is as truly an overgrowth of Luscka's tonsil as is a wart an overgrowth of a papilla of the epidermis. The two differ in all respects only as the corium of the skin differs from the lymphoid cushion in the pharynx whence each has its respective origin. The resemblance between them may be seen in the different degrees of consistency that each presents, due in both cases to the rapidity of growth, the age, and the peculiar condition of irritation to which either may have been subjected. These vegetations are found between and just posterior to the orifices of the Eustachian tubes, they rarely push forward enough to encroach upon the choanæ and enter these orifices. When felt with the finger, introduced through the pharynx as well as when seen with a posterior rhinoscopic mirror, the mass resembles brain tissue in its consistency and in its furrowed surface. While it is a so-called hypertrophy it is but little like the hypertrophies that we encounter elsewhere, except in long existing cases, and in older subjects than it is ordinarily found. In such cases the growth is comparitively small and does not obstruct breathing to any great extent although it may decidedly alter phonation and cause a dead or muffled voice-tone. By common consent another name is usually applied to this particular condition viz:—hypertrophy of the pharyngeal, third, or Luscka's tonsil. This is, however, a distinction without a real difference. It is this form of adenoid growth that in so many ways resembles a verruca.

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*Read before the "Tri-State Medical Association," October, 1894, in Atlanta.

Nothing is definitely known as to the cause of adenoid growths, unless an hereditary tendency, as a predisposing cause, together with often-recurring colds as the excitant, can be regarded as a satisfactory etiology. They occur much more frequently in children, and often in such cases disappear spontaneously when the subject has nearly or quite reached maturity still it is not a rare occurrence to find them in young adults or even in those who have reached middle age.

The diagnosis is easy, indeed by exclusion, the nature of the growth and character can always be reached. Digital examination is the surest means in all cases, but particularly so in children where posterior rhinoscopy is often impossible. The finger finds a mass in the superior pharynx that is yielding and gelatinous, with a furrowed surface that imparts somewhat of a wormy feeling, except in older subjects where the growth has undergone fibrous changes when the finger detects considerable hardness.

Posterior rhinoscopic examinations will often reveal the condition in this post-palate space perfectly, but it can rarely be successfully used with young children. Anterior rhinoscopy will occasionally reveal the growth, but as a rule the turgescence of the turbinates which exists as one of the many sequelæ, will obstruct the view through the nose. The diagnosis is, however, usually so easy when we consider the age of the patient, the deafness, the open mouth, the vacant expression of the face, the retarded chest development, the small alæ, the inability to blow the nose, together with the history of snoring or difficult sleep-breathing that a farther examination, by touch or vision, is necessary only to confirm an opinion already formed, and to discover the extent, the situation of the vegetations and the probable sequelæ. An examination by sight or touch may be necessary to exclude polypi, which are mostly confined to adults; or post-nasal abscesses, not often seen in children; or bony growths, rarely found at this time of life; or foreign bodies such as buttons, beans, etc., thrust into the nostrils by young children. To glance at the child and hear his nasal tone is often sufficient to form a measurably sure diagnosis. On the other hand, it does not always follow that the child has adenoids, because he snores and keeps his mouth open, and is constantly enjoined by his mother to close the mouth and blow the nose, etc., as catarrhal tumefactions of the turbinates with enlarged tonsils may be the cause. In either case the treatment that succeeds in restoring an opening to the nature's normal breathing space—the nasal cavity—and thus enables its large mucous membrane surface, in an adult about thirty-six square inches—to perform its double functure of supplying moisture and warmth to the inspired air, will accomplish good results in many ways that are often-times unexpected.

Coincident and sequelæ symptoms may be revealed by physical examinations, such as lymphoid granulations of the pharynx and tonsils; a general catarrhal condition of all the nasal and throat mucous membranes; middle ear inflammations, either from direct pressure on the orifices of the Eustachian tubes or from extention of the inflammation by continuity to the middle ear. More or less deafness often results, whether it be due to the direct pressure of the growth on the orifices, or to the inflammatory extension through the tubes to the drum, and in some cases, though not often, when the result is a suppuration and bursting of the drum membrane.

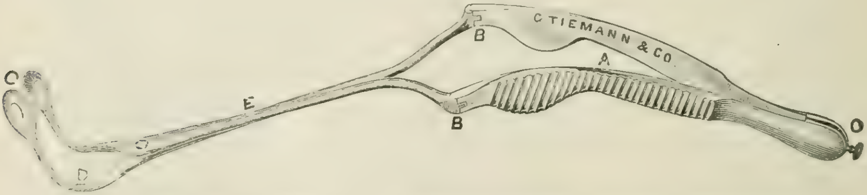
In the treatment of adenoid vegetations it has not seemed to me an absolute necessity to make a complete and thorough excision, although that end should always be accomplished if possible. A thorough removal is more to be desired in Eustachian tube and middle ear complications than when a nasal stenosis is the chief symptom. Atrophy of a small remaining portion of the mass will usually follow the operation that has decidedly interfered with its blood supply.

It was my first intention, to speak only of the treatment of adenoids and describe the new instruments made for me by the Tiemanns, of New York, for their excision, but at the request of the President I have added what I have just read. The mechanism of these instruments, which I shall presently discribe has rarely, if ever, been applied before to surgical instruments.

Lenox Brown advocates the use of the finger nail, or the gouge-shaped thimble. In using either, there is danger of detached pieces falling into the larynx as the pressure of the fingers upon the root of the tongue prevents the reflex resistence that would otherwise guard against such an accident. Gottstein's large ring curette is popular with many, especially in England and Germany. Griffin's malleable shank currette which is much smaller than Gottstein's is more popular in this country, and I think justly so. Bosworth's rigid shank is perferable but not so generally adaptable, nor is it so safe in the hands of a novice. Meyer, who has the honor of first describing adenoid vegetations and how to excise them, uses a ring shaped knife through the anterior nares, which means is resorted to now by some operators. Justi and Hartmann have each their own particular side-to-side curettes which they apply through the mouth. Voltolini was, for a long time, partial to electric wire loop inserted beneath the palate; a very effective means but one involving considerable trouble and not now much used. Blake's operation through the anterior nares with the cold wire has recently been extolled by Chiari, of Vienna, who has used it to his own satisfaction in over two hundred cases. I have used Blake's method in about sixteen to twenty cases with some—even much—satisfaction as to the results, but have always chosen the cases suitable for its use. In no case have I ever tried it in a child with small nares, nor indeed on any subjects where I could not see the mass through the nares with a strong electric light. Gibbon's adenotome—a guillotine in principle—would possibly not prove as successful in other than its author's hands. Loenberg and Michael prefer forceps with bullet-shaped jaws. Guillian's, is somewhat simular to the preceding forceps, except it has horizontal cartrige-shaped jaws. Gleitzman's forceps, and also Elsburgs, have been more popular in Germany, France and England than in this country. The Hodge forceps one of the few with fenestræ has not proven popular on account of the length of its blades, straightness of its handle, and smallness of the fenestræ, together with its narrow uvula space.

I will not attempt to mention the many other valuable instruments that have been used in this operation. Notwithstanding their large number and variety, it would seem that no one instrument has yet gained any decided preponderance of favor.

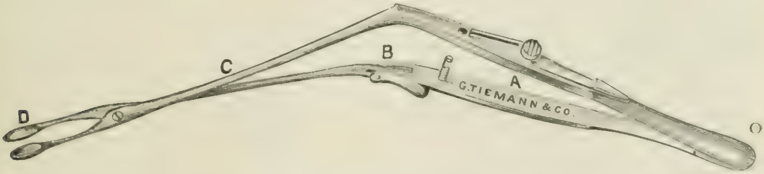
The very nature of these cases, affording as they do, so many ways of being reached, and giving such brilliant results when successfully removed, is calculated to develop an individuality in the practiced operator. May I use this reason as my excuse for describing the two instruments below?



The adenoid forceps as illustrated has a hinge and spring mechanism (B. B. & O.) not generally applied to surgical instruments. The obtuse angle at (B B) removes the hand below the line of vision when grasping the handle, and the space at

(D) allows the uvula to drop through and save it from contusion. The blades at (C) (drawn too small in the illustration) have olive shaped edges, not sharp but sufficiently acute to pass through adenoid tissue. The object of the fenestræ in the cupped jaws is to allow the soft tissues to be squeezed through and admit of a complete approximation of their edges. This obviates a tearing downward pull, and hence a dislodgment of the instrument. With this advantage, several grasps at the growth may be made at one sitting, perhaps as many as may be necessary for the removal of the whole mass. The blades are so shaped that they will only grasp redundant and protruding tissue, hence the comparative safety of the instrument, even in the hands of a novice, or in other hands when used without sight. The instrument may easily be inverted and used as inferior pharyngeal forceps, and on account of the short curve at (D) it is often better adapted to laryngeal purposes than the commonly used alligator forceps (Mackenzie's) with its long curve. The makers will reverse the angle of the handle, when desired, for this purpose, or vary the form and shape of the blades from their model as illustrated.

By a few turns of the screw at (O) the blades can be detached in order to render them aseptic. The instrument is beautifully made by the Tiemanns, of New York, 107 Park Row.



The small nasal or naso-adenoid forceps as illustrated, was designed to take many of the places now occupied by the Alligators, by supplying from eight to twelve times the power, and at the same time occupying no more space for small cavity operations. The mechanism (O B) consists of a spring handle, the upper part of which is rigidly joined to the upper shaft at an angle of forty-five degrees, while the lower part moves by a pivot through a curved slot in the lower shaft at their junction. The adaptation of this principle to surgical instruments is as new as was the alligator principle not many years ago. The jaws at (D) admit of even a greater variety of shapes, and indeed the many times greater strength of this instrument, while its size is no larger, inspires a confidence in the operator that he could not feel while using the weaker alligator instrument. The downward turn of the handle (O to B) removes the hand from the line of vision, and the thumb catch at (A) holds the jaws (D) firmly together without the fear of breaking or even of springing. The shank is made long enough to reach adenoid tissue through the anterior nares when desired. The instrument may be used as a needle holder when properly groved; its jaws may be made with teeth for tearing; with sharp oval edges for cutting; vulsellum formed for using as tentacles; scissors shaped for clipping; with wedge and fenestra (Rougeur) for nipping; duck-billed for seizing; or indeed the jaws may be shaped to serve almost any conceivable purpose.

While the instrument is modeled by the Tiemann's, of New York, in the shape illustrated, this House will furnish it with jaws in any form, and still retain its strong and characteristic mechanism.

[*For want of space the proper heading for the department to which this paper belongs could not be inserted.—Editor.*]

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By ALVIN A. HUBBELL, M.D., Buffalo, New York.

(*Continued from page 260 current volume.*)

INJURIES.

LEBER (4) had found that injuries of the eye from copper or brass are generally aseptic. Test cultures, however, should be made, and if micro-örganisms can be grown from the extracted foreign body or from the discharge from the wound, the eye should be enucleated; but if aseptic, the wound soon heals, and there is very little danger of sympathetic ophthalmia, as the latter is almost always septic in origin. It had not occurred in any of his cases, forty-six in number. Conservative treatment is especially indicated as long as the function of the retina is intact. He believed that in working people the retention of the globe is desired as they consider a globe, however disfigured, better than any substitute.

Knapp reported a case in which, twenty-three years ago, he had extracted a piece of gun-cap from the bottom of the vitreous which had entered the eye through the ciliary body three days before. He did this by means of a curved, grooved hook, passed through an opening made in the sclera, the fundus of the eye being illuminated during the operation by a head-mirror. A cyst afterward developed at the point of entrance of the foreign body which he radically removed. He had seen the patient the past winter, and found the eye in good condition and with good sight.

Roosa, of New York, asked Leber if the situation of the wound had been fully considered by him, in speaking of the danger of sympathetic inflammation. It seemed to him that even an aseptic wound in the ciliary region might cause sympathetic inflammation, while one in the cornea or sclera might not.

Noyes had seen cases in which pieces of gun-cap remained visible on the retina for many years without further injury; but it had generally been his rule to enucleate eyes thus injured. It would be a great relief, both to him and his patients, if Prof. Leber could show him how to save such eyes, for the saving of even a deformed eye is a most precious attainment.

Kipp, of Newark, N. J., mentioned a case in which a piece of gun-cap entered the eye through the cornea and lens and lodged in the lower half of the retina, twenty-four years ago. The lens became absorbed. when the retina was seen to be clear, except at the point where the foreign body was lodged. There was no detachment, and vision is $\frac{20}{80}$.

Meyer, of Paris, had published a curious case in which a piece of gun-cap had entered the eye of a boy and could be seen resting upon the supero-external part of the fundus. A year later it was found to have been spontaneously expelled at the point of entrance, in the midst of a small subconjunctival abscess.

Leber, in closing, said that not in one case of his had he observed either sympathetic irritation or inflammation. He did not fear sympathetic irritation by reflex action, because this could be inhibited by performing enucleation afterward, if necessary. In two cases in which he had, for greater security, enucleated the eyeball, anatomical examination gave him the impression that the enucleation might have been avoided.

Panas (5) concluded his paper with regard to traumatic motor paralysis of the eye due to compression, as follows:

1. In the majority of cases the paralysis is due to fracture of the base of the skull.

2. The absence of depression of the bones of the vault of the skull is no proof that fissures do not exist in the base.

3. The nerves most frequently paralyzed are the sixth pair, owing to their being most intimately connected with the bone in question.

4. The compression may be caused either by the fracture itself or by hemorrhage into the cranium. In the former case, the paralysis is more or less immediate; in the latter, it may not appear until late, as in plastic exudations by phlogosis.

Chibret had recently had a case in which a lad had had his head squeezed transversely, through some mismanagement of an elevator, and three months after the accident had paralysis of both sixth nerves. He was obliged to practise a tenotomy of both internal recti muscles to enable the patient to walk without difficulty.

Dufour (18) read an interesting paper on the accidental retro-choroidal hemorrrhages which sometimes take place after operations on the eye. The accident was rare, Alb. von Graefe having only met with it twice in his extensive experience. The origin of the hemorrhage is retro-choroidal, as was obvious from a case in which he has seen it supervene after an iridectomy for the relief of extreme pain in a case of alsolute glaucoma. The eye was enucleated, and examination showed that a large hemorrhagic focus had pushed the retina and choroid toward the wound.

No examination of the eyes or of the heart and vessels had ever enabled him to diagnosticate, beforehand, a liability to hemorrhage. At first he had resorted to hemostatic measures, such as refrigeration, pressure and derivation, without success. In one case he enucleated the eye. During the past four years, as soon as he had noticed symptoms of this complication he had injected a large dose of morphine into the temple, near the eye. He suggested adding to the injection a substance susceptible of producing nausea. He has treated three cases in this manner, with much less serious results than by other methods.

Ayres, of Cincinnati, reported a case in which this accident occurred four hours after iridectomy for glaucoma in a patient sixty-five years old. The entire vitreous was forced out. The eye was immediately enucleated.

Gruening, of New York, had seen the accident follow a cataract extraction in a man nearly ninety years old, in his own practice, and in another patient in Paris almost eighty years old.

Power, of London, thought it was remarkable that the accident was not more frequent, in view of the sudden reduction of tension in operation. He had had two or three cases occur in eyes that were not healthy. In one case an iridectomy had been performed, and in another a cataract extracted.

Darier thought the idea of provoking nausea to arrest hemorrhage seems practical, and suggested the injection of a small dose of apomorphine.

Dufour said, in closing, that the first two cataract patients were seventy and eighty years old respectively, the two glaucomatous cases were over sixty, and the last three operated cases were nearly seventy. He thought a solution of apomorphine and morphine would suit very well. But the cases occurred unawares, when the apomorphine was not immediately at hand. It would be well to have it in reserve.

MEDICAL THERAPEUTICS.

Mules (6 *b*) reported unusually good results in the treatment of corneal ulcers by placing an antiseptic wafer over the cornea and then using an iodoform pad with a bandage over the eyes for several days. The wafer is made of gelatin, a saturated solution of boracic acid and iodoform in impalpable powder.

It is dipped in boracic acid solution before being used. Cicatrization often occurs in three days.

Noyes said that Dr. Williams, of Cincinnati, at the meeting of this congress in 1876, recommended the use of pure carbolic acid to corneal ulcers, and he (Noyes) had many times proved the value of this procedure. Only one application is generally necessary, the result and the indications being practically the same as those in the use of the actual cautery.

VIAN (20) recommended crude petroleum in the treatment of diphtheritic conjunctivitis, and reported three cases illustrating its effect. The first was one of ophthalmia neonatorum which in a few days was transformed into pseudo-membranous conjunctivitis. After failure with various remedies and loss of the right cornea by necrosis, he began cleansing the mucosa and palpebral folds twice a day at first, with a pencil dipped in petroleum, and later every three hours. Improvement began at once and recovery rapidly took place.

The second case was one of marked diphtheritic conjunctivitis in a child three years old, a grayish exudate completely covering the conjunctiva, the lids being indurated and swelled and the cornea becoming cloudy. The case was fully recovered after forty-six days under the applications of the petroleum.

The third case was in a boy three years old, but the disease was less severe. He was restored in a month by the same treatment.

He suggests that the applications of the petroleum should be made every hour.

BACH (24) believed that sub-conjunctival injections were ineffectual in corneal abscess, and was sustained in this belief by experiments made on rabbits in which he had produced corneal ulcers and abscesses by staphylococci. He preferred cauterization to grattage of the abscess as more certain and, also, as less dangerous. Hypopyon implies an inflammatory complication on the part of the iris and ciliary body.

CHIBRET (29) for twenty-nine years had suspected that iodide of potassium did not possess specific value in syphilis. Nineteen years of ophthalmic practice had confirmed him in this opinion. Observation and experience had established in his mind the following propositions:

1. In ocular syphilis, mercury, singly, acts nearly always; iodide of potassium, singly, never acts.

2. In general syphilis, mercury, alone, acts nearly always, and on all the accidents; iodide of potassium, alone, only acts on certain accidents and in an inconstant manner.

3. In ocular and general syphilis, mercury, alone, may serve as a test to fix the etiological diagnosis.

4. Mercury, alone specific in syphilis, is in the meantime a poison of the organism, especially of the nervous system; whence the gravity of nervous syphilis.

5. Iodide of potassium, as a counter poison to mercury, is frequently indicated in syphilis to eliminate or make tolerable the mercury.

6. The iodide acts, moreover, on lymphatism and on rheumatism.

7. Severe syphilis is only affected by mercury alone, or in combination with iodide.

Saturation and poisoning (salivation) by the mercury are the formal indications for the iodide of potassium.

He prefers to administer mercury by injections into the buttocks. He uses the soluble salts of mercury, and preferably the cyanide. He dissolves this in the proportion of 1 to 200 of water and glycerine with a slight addition of cocaine. A medium dose of this is one half centigram, and this should be repeated daily for from four to nine days, and then three times a week. If diarrhea supervenes, the injections should be suspended. The treatment, with occasional interruptions, should be continued two years at least, and even three or four in subjects in the decline of life.

Darier (30) gave preference to the injection of soluble salts of mercury, especially to the cyanide, when mercurial treatment is required in ophthalmology. He employed them largely diluted and repeated them every day or every other day according to indications. When the injections were not practicable he used inunctions. He somtimes used the "massive injections of insoluble salts of mercury" in cases which had already had a certain amount of mercurial treatment and were tolerant of it.

Intra-ocular injections were especially indicated in serious affections of the vitreous, deep-seated traumatic infections, advanced sympathetic ophthalmitis, grave syphilitic troubles which have resisted both general treatment and sub-conjunctival injections.

Sub-conjunctival injections have numerous indications: (1) they act as the most powerful and prompt means of practising antisepsis in traumatic and operative infection, in infective ulcers, and abscesses of the cornea with hypopyon; (2) they have a strong, resolutive action on torpid, parenchymatous keratitis, on choroidal exudations, and on plastic iritis when no well-marked nervous stasis is present; (3) as an anti-syphilitic, their action on the ocular manifestations of syphilis in all its stages is rapid and sure.

The principal contra-indication of sub-conjunctival injections is where there exists a vascular engorgement of the pericorneal network. The resorption is then very slow, and there is often violent reaction which is more alarming than dangerous.

Gutman had tried Darier's method in fifty cases without success. In a case of severe specific irido-choroiditis it made the disease much worse, and in another case hypopyon supervened.

Chibret had used sub-conjunctival injections of cyanide of mercury in ocular syphilis, especially in interstitial keratitis, with no question as to their efficacy. In suppurative diseases of the cornea and other diseases he had had variable results.

Hess and Bach in experiments with these injections of corrosive sublimate in rabbits, had not found the slightest effect on the course of corneal ulceration.

Deutschmann, who had made over 2,000 sub-conjunctival injections of corrosive sublimate, showed himself a partisan to this method. He had found them useful in both specific and nonspecific diseases of the eye, though more so in the former. In parenchymatous keratitis and acute iritis they are very beneficial. In corneal ulcers they are preferable to the actual cautery. These injections have the special merit of shortening morbid processes. But in post-operative suppuration they are not the best means of controlling the situation. They are also without effect in affections of the optic nerve.

Dufour affirmed the good results obtained by sub-conjunctival injections. He said it was probable that the quantity of corrosive sublimate necessary to be effective was much less than had been believed.

Darier replied that, contrary to Hess and Bach, mercury had been found in the eye by electrolysis in the experiments of Bonhi, Gallemaerts and Joly. The experiments of Hess demonstrated only that rabbits are refractory to these injections. From a clinical point of view, they have given good results to those who have used them on a large scale.

Valude (36) desired to add one or two recent observations to the facts he had published during the past year on the use of antipyrin in certain forms of optic-nerve atrophy, and to mention a case published by Dr. Bistis, of Constantantinople, where antipyrin had succeeded in ameliorating an optic-nerve atrophy which had resisted a variety of treatment.

The antipyrin should be given by hypodermic injections, using two grams of a saturated solution (one gram to two grams of water) every two days. This treatment is not suited to all forms of optic atrophy. It is only indicated in those which are consecutive to descending neuritis and which have their origin in meningitis or pachy-meningitis, localized or general. In these cases the amblyophia has been preceded and is accompanied by headaches, and there were signs of optic neuritis before the atrophy.

The treatment by antipyrin suppresses the headache and increases the acuity of vision when all other treatment has failed. The most useful increase of the visual acuity is for near work.

SURGICAL THERAPEUTICS.

SNELLEN (1) read a paper recommending the covering of all operative and accidental wounds of the cornea and sclerotic by conjunctival flaps. In cataract extraction, Graefe's knife should be used and a conjunctival flap made. After enucleation the suturing of the conjunctiva favors healing. In wounds of the cornea or sclerotic, conjunctival flaps should be cut and stretched over them by sutures. After strabismus operations the conjunctiva should be made to cover the wound.

KNAPP (2) read a paper on 600 cases of cataract extraction which was listened to with great interest. He said that during the last four years he had performed 630 cataract extractions, but 30 of these being so complicated that a good result was impossible, were excluded from the report. Among the 600 extractions 52, or 8.6 per cent., were combined with iridectomy, indications for the latter being: (1) pathological condition of the eyes; (2) a manifest tendency to prolapse of iris, that is to say, the impossibility of obtaining a central pupil and maintaining it in its place during the eye movements, or while carrying the patient from the operating chair to the bed, and for fifteen or twenty minutes afterwards; (3) accidents occurring in the course of the operation. The visual results were good in 49, bad in three cases.

Out of the other 548 operations of simple extraction, *retention of the iris by constriction* took place in 55 cases (10.03 per cent.), a condition which was treated by operation (iridectomy, ablation with the aid of a galvano-cautery) in 14 cases, that is to say, in 25.5 per cent. of the number of cases of incarceration of the iris, or 2.5 per cent. of the total number of extractions, among which were two cases of extractions with iridectomy. Among the 55 cases the result was good in 49 ($\frac{20}{20}$ in 7 cases), fairly good in 2, loss of eye in 2, loss of both eyes in 2. In one of the last the eyes were degenerated, and the other presented an extremely marked rheumatic diathesis.

Among the 600 cases of extraction, he performed 403 operations for secondary cataract, that is, 67 per cent. Almost all consisted in discission with a knife-needle. The reason for performing so many secondary operations was that he wished to give the patients the greatest possible visual acuity and to make it permanent. He had done this operation so often that he regarded it as almost wholly free from danger. In the present series of cases, visual acuity diminished a little only in eight or ten, but in one case the eye was completely lost in consequence of acute glaucoma, which supervened while the patient was returning to his home, which was situated at some distance from New York. The nature of the disease was not recognized, and the patient was treated by instillations of atropine. This was the second case of that kind which had come to his knowledge, but these two were the only cases of loss of the eye in at least 1,500 operations of secondary discission.

Acute glaucoma is an inherent consequence of discission; but it can invariably be cured by myotics, or iridectomy, and possibly by paracentesis of the anterior chamber. Among the 403 operations mentioned in this report, it occurred in 12 cases, or 3 per cent.; in 4 of these it yielded to the application of eserine; 7 were healed under the influence of iridectomy, and the twelfth was the one to which he had referred as resulting in loss of the eye.

Little, of Manchester, related his experience of the past five years, which included 428 extractions, of which 322 were with iridectomy, and 106 without. In the latter he had four failures, of which 2 were from suppuration and 1 from glaucoma. In 10 cases, 2 of which were lost, as stated, there was prolapse of the iris. In 7 of these the iris was excised without bad effects and in 1 the prolapse was not touched.

Panas spoke of the treatment of secondary cataracts (secondary opacities of the capsule), and said that he had practised the secondary operation, by extracting the capsule, for more than twenty years, without causing any primary or consecutive complications, and with the result of raising the vision from $\frac{1}{15}$ 1. He had twice seen glaucoma after simple extraction of cataract.

Swanzy, of Dublin, said he was an advocate of the combined method, the iridectomy being small. In 200 consecutive cases he had but four of incarceration of the iris in the wound, or 2 per cent. He would be glad to adopt the simple method when Prof. Knapp had reduced his cases of iris prolapse and incarceration to one per cent., or, at any rate, to less than 2 per cent. Iridectomy had, moreover, no disadvantages beyond the unimportant one of a very slight disfigurement, which neither the patient nor his friends often discover.

Noyes said that apart from cases in which there was (1) undilability of the pupil, (2) the presence of a large amount of cortex, and (3) increased tension of the ball, he preferred the simple operation. His incision was almost a semicircle of the cornea, and the capsulotomy was in the form of an inverted T. He used atropine, both before and after the section, thus preventing adhesion of the iris to the capsule. The disadvantages of iridectomy in extraction, were: (1) the additional steps added to the operation; (2) the painfulness of the operation, in most cases of excising the iris; (3) the occurrence of incarceration of the iris or capsule in no small number of cases.

Hansen-Grut, of Copenhagen, said that they had all practised what Prof. Knapp had described. But all could not keep their patients sufficiently long to perform the discission, which he advises not to be done until three weeks or more after the extraction. Knapp seemed to have more obedient patients. On the whole, they would do well not to go far into the discussion of methods of extraction. Every experienced operator believes his own method to be superior to that of any other man, and would not be taught. The old practitioner will not benefit by discussion, and the younger operator will only be puzzled.

Critchett, of London, said he was in accord with Swanzy. To avoid the pain of iridectomy, to which Noyes had alluded, he had adopted the plan, since the first introduction of the use of cocaine, of passing after the section is made, a few drops of a fresh, sterilized solution of cocaine directly into the anterior chamber, by means of a curette. At the end of a minute or two the iris is anesthetic, and can be excised without pain. No ill effects had ever followed. In discission of the capsule, he preferred a horizontal incision.

Teale, of Leeds, said that having been for the past twenty years an advocate of the simple extraction, it was his conviction, that with a suitable section, such as he had described in his Bowman lecture in 1893, the simple involves no difficulties from which the combined operation is free; that it has technical advantages over the latter; that in its average results it is equal to it, and in its perfect results, superior.

Snellen thought that statistics could not decide the comparative value of different methods of extraction of cataract. The choice of patients, the skill of the operator, the ability of assistants, the quality of instruments, and other circumstances must be taken into consideration. In the simple operation, he never replaces a prolapsed iris, but excises it at once. To prevent prolapse of the iris, pilocarpine should be applied during the operation; the eye must be thoroughly anesthetic, no speculum should be used, and the section should be large. The capsule may be needled two weeks after the extraction when it is easily done.

Knapp, in replying, said that it was on the strength of his recent experience that he maintained that the simple operation is not only the safest, but the best operation. Swanzy credited him with 10 per cent. of prolapses, but only fourteen cases, or 2.5 per cent. of all, had required operative treatment. The others recovered spontaneously, some with persistence of a small unirritative protrusion, not seriously interfering with sight, and in the others the prolapse disappeared. The eye, after a combined extraction, was, by the frequent incarceration of invisible iris and capsule in the scar, less resistant to obnoxious influences than when the iris was preserved. He practiced secondary discission in about two-thirds of his cases, and few patients objected to it. If successful, it left an ideal eye. The discission can be done at any time, without notable reaction, if the pupil is free from inflammatory products.

(To be continued next month).

PRACTICAL ADVICE UPON CATARACT EXTRACTION FOR THE YOUNG OPHTHALMOLOGIST.

By **DR. HERMANN PAGENSTECHER**, of Wiesbaden,

Translated from the Klin. Monatsblatter fur Augenheilkunde by Dunbar Roy, A.B., M.D., Atlanta.

He who has pursued throughout a long series of years the different articles upon the important subject of cataract extraction, will be obliged to admit that never have so many different opinions been held in regard to this operation as is just now the case. The yearly proposed modifications or pretended improvements in the technique of the operation will scarcely make a mentionable impression upon those ophthalmologists who have had many years of independent experience, and at the same time have had a large amount of operative material at their disposal. Such will quickly perceive what is best to be kept from those improvements especially proposed and will appropriate perhaps one or the other which is the least different from his old and tried method, but still remaining essentially true to the latter.

Quite otherwise is it with the great host of young ophthalmologists who lack an extended experience, and who have at their disposal a very limited amount of material. They are in danger, on account of the manifold opinions now existing, of doubting in themselves, and they will err from the maxims already learnt, thus losing those fixed ideas which are so necessary and important to every operator. This struck us very forcibly in the article by Landolt upon the present status of cataract extraction to date. Landolt has taken the great trouble in the above mentioned article, of bringing together the opinions of a large number of ophthalmologists, upon first this point and then that. Even though thanksworthy was the task, and even though the individual opinions are so interesting, yet most of the readers will have gathered from it only what they have long been cognizant of, and that is that you can operate upon cataracts in very many different ways, and that the fancies of the different operators who adapt themselves to the many operative dexterities, are very varied. On this account the young ophthalmologists are in danger of becoming very much confused. On the other hand the question as to the fitness of the cataract for operation, will occasion doubt; the question as to whether the present unripe cataract belongs to the class of operative or nonoperative. Has he made his decision on this point, then another question arises to him; shall I operate with or without iridectomy, shall I remove a piece of the anterior capsule or shall I simply rupture it, and finally shall I irrigate the anterior chamber or not. We will consider for example in the above article one paragraph bearing upon this latter point. There appears on page fifty-seven this sentence, "performed in a very cautious manner" the caution consisting mainly in this, that the irrigation of the anterior chamber shall be accomplished by means of a forcible stream of lukewarm, sterilized water without introducing the point of the instrument in the eye—"let the intraocular irrigation be carefully watched." "Nevertheless we should limit its use as a rule to those cases in which the aqueous humor is not sufficient for the complete expulsion of the lens debris, and for that reason we must not only be very carefully concerned as to the nature of the fluid used, but also as to its quantity and pressure." Colleague Landolt no doubt understands what he has to do in such cases, but I believe that between the lines I can read that he is no exalted adherent of this anterior chamber irrigation. I cannot comprehend why the young ophthalmologist should begin his practice bewildered with so many different advices. I have always endeavored to impress upon my assistants as well as the young physicians who visit my clinic, this important point, that they should never indulge in experiments but should hold fast to those indications and methods which from past experiences, and from the facts that they are the easiest to perform, afford the best chances for restoring the vision, and in using which the operator is never in doubt at any moment as to what is the next step to be taken. The young ophthalmologist should not be misled by attempting a method of which he is not completely master, simply through the idea of a cosmetic effect or the prospect of eventually obtaining a better acuteness of vision. He must, before everything else, go the safest way, and should omit nothing which could, in the remotest degree, effect either the result of his operation or even be questioned. It behooves him to be concerned not only on account of its obtaining for him a good reputation, but, what is yet of greater importance, to be concerned for the welfare of the patients who have entrusted themselves to his professional care. First by degrees, after his hand has become steadier and he has become a better master of the technique—for cataract operators do not fall from heaven—he should seek out those cases of which he can attempt some modification, some slight change from the methods usually employed by him, and in this manner find out through his own experience what operative measures are suitable for each form of cataract, and furthermore, after he has thus obtained his operative dexterity, he will also be able to perform the same without further practice.

The advice which I give my assistants refers, in the first place, to rules and regulations of a general nature, and in the second place, to the peculiarities in the operative technique.

I. You should never operate upon a patient who has the slightest degree of fever.

II. You should find out positively whether there exists in the neighborhood of the eye to be operated upon, a source for a probable infection of the wound; the conjunctiva should be examined, the lids and their free border, and observe especially the condition of the lachrymal sac and duct.

III. You should examine into the condition of the fellow eye, and operate then only when the same shows no trace of irritation. Should the fellow eye be phthisical or yet painful on pressure, then you should enucleate it, or if that is refused then you should make beforehand a resection of the optic nerve. Should symptoms of sympathetic irritation be present, then you should wait at least six or eight weeks after enucleation before operating on the other eye—for sympathetic irritation can be increased to sympathetic inflammation through operative interference. Should the fellow eye show other inflammatory signs, especially of the iris and ciliary body, symptoms of iritis serosa or glaucomatous changes, then you should not operate until all these symptoms have completely subsided. Has the fellow eye in consequence of these or other processes, or in consequence of operative interference, lost every chance of again obtaining a useful vision, then you should enucleate the same, but wait at least four weeks before performing the extraction, even if there are no appearances of sympathetic irritation.

IV. You should operate only on ripe cataracts.

V. You should operate only after a thorough cleansing of the operative field and its surroundings, the instruments and hands —Antisepsis should be considered so far as this is generally permissible and possible with the eye.

VI. You should separate the lids by means of retractors, which can be easily and quickly removed at any moment. With fixation forceps you should grasp the bulb as near as possible to the corneal rim exactly in that meridian which will run through the middle of the contemplated incision. You should make the incision with a small sharp Graefe knife through the sclero-corneal junction but aiming, however, to pass beyond the rim above so as to make a conjunctival flap. The incision should not be too great, yet above all not to small. about one third of the corneal circumference. It should be rather curved, for the strictly linear incision is not to be recommended. However the form of the incision is not so important as its size and situation.

VII. You should always make an iridectomy and replace the pillars before opening the capsule. Should this latter be found difficult of performance then you should clip off these protruding pieces of iris.

VIII. You should rupture the anterior capsule sufficiently in every direction, taking care not to produce a dislocation of the lens. You should avoid rupturing the capsule too peripherally. Only those anterior capsular cataracts which are very marked, should be removed with the forceps. An attempt to remove a transparent anterior capsule with forceps by an inexperienced hand can very easily cause a luxation of the lens, and thereby a loss of the vitreous body.

IX. You should expel the lens by means of pressure at the lower portion of the corneal rim, best of all with a glass spud, and at the same time evacuating the remaining cortical debris by means of gently stroking the cornea. After this, if there still exists any cortical remains, the lid retractors having been removed, these can be expelled by grasping lightly the upper and lower lids between both thumbs and gently stroking the anterior portion of the globe with both lids in the direction of the incision. This procedure should not be carried on too long for fear that these cortical masses which are yet visible might remain back; likewise you should make no further attempts at removing any capsular remains with forceps.

X. The irrigation of the anterior chamber should be strenuously avoided.

XI. Should prolapse of the vitreous occur even before the capsule is ruptured, then you should remove the lens with capsule entire by means of a shallow spoon or fenestrated loop. This latter procedure can also be primarily used in over-ripe and much shrunken cataracts, especially if the tension of the vitreous is slight, and when you are operating upon a quiet and very sensible patient.

XII. The dressings should be made with only sterilized material.

XIII. The discission of a secondary cataract should be made only upon an eye free from irritation, yet as early as possible. The longer you wait the tougher the membrane becomes, and you will have great difficulty in producing an opening of sufficient size.

XIV. You should never undertake a discission by means of a needle introduced through the cornea, but it should be introduced through the sclero-corneal junction about three fourths or or one mm. from the corneal rim.

These in a few lines, are the rules which I am accustomed to give to my assistants and the young ophthalmologists who visit my clinic, on the grounds that I have had a peculiarly large experience and observation upon the manner and way in which beginning ophthalmologists operate upon cataracts, and the manner in which by degrees they become familiar with the technique. I consider it of the greatest importance that an assistant,before he goes into practice, shall have performed a certain number of cataract extractions under the guidance of his teacher. The best operative course does not match a single cataract extraction upon the living subject, and the young ophthalmologist will go into the practice with quite a different confidence in himself if he has already had the occasion beforehand of treating a living eye with the knife and scissors. Even though the above mentioned ground-principles, which will certainly serve the young ophthalmologist as the best, are generally authoritative for me individually, yet it sometimes happens that in certain cases I deviate from the principles thus laid down. I do this on the grounds of individual experiences and observations which have presented themselves during the course of a long and active practice in ophthalmology, and which have taught me that special kinds of cataracts either allow certain modifications from the above mentioned normal indications, or even indicate them.

For instance in some cases I now frequently operate without iridectomy; in certain others, I remove the lens with its capsule entire; while in still others again I have made the incision with a broad, instead of with a small Graefe, knife, and so further. It would take too much time for me to point out the reason why in some cases I do this while in others I omit that, for it does not belong to the scope of this article, in that it has been written solely for the purpose of pointing out a safe way in which ophthalmologists just beginning the practice, can operate on all cataracts. He must himself find out by degrees in what cases, and how far, he can deviate from the principles thus laid down. In regard to certain points which have been mentioned above, I will on the other hand consider more in detail.

The old teaching that one should only operate on cataaracts thoroughly ripe, has of late years received a wonderful "shaking up," and day after day one does not fear to extract a lens which is only slightly opaque, provided only that such a patient is old enough. A limit no longer exists, and different operators modify their operative technique in an unlimited degree on the ground of individual experience. It is indeed fortunate that one need not wait, in a certain number of cases, for complete opacity of the lens, in fact cannot wait because many cataracts moreover do not become completely opaque, but yet as they exist, disturb in a very marked degree the vision of the patient. This happens especially with cataracts in which the posterior pole is decidedly opaque, while the nucleus and anterior pole show but slight opacity and with which at the same time there has already occurred a shrinking of the whole lens substance. It is also fortunate that one can operate upon cataracts with only slight opacities, be such in the equator, nucleus, anterior or posterior pole of the lens, provided only that the sclerosis of the nucleus has to some degree advanced. But when one compares the results obtained in such cases with those in fully ripened cataracts, by careful observation he will come to the conclusion that one would be surprised at the number of complications which follow the operations on unripe cataracts, such as thick secondary cataracts, iritic irritations, and in some cases even followed by symptoms of glaucoma so that frequently the final result is very much obscured. On this account my advice to the young ophthalmologist who, according to the teachings of to-day, will very frequently be in doubt as to whether the opacity has advanced far enough for him to undertake the operation in the case before him, is to wait for the natural ripening of the cataract if he wishes to obtain the best results, or in case the patient is urgent for an operation he can perform an iridectomy followed with a gentle massage of the lens through the cornea for the purpose of producing an artificial ripening. In addition it sometimes happens that patients with unripe cataracts who have been operated upon most successfully are by no means pleased with the results obtained (in the vision); this is especially true of patients with hyperopic eyes. According to my experience too great a risk is being taken in operating upon unripe cataracts, and I am of the opinion that this reaction will not hold out, just as they are now shooting wide of the mark in reference to the cure of myopia through the removal of the lens. In this latter a revulsion it sure to follow either in the near future or at a later period. In preparing for the operation a thorough cleansing should be made of the whole operative field. The manner and method as used by me in the clinic is as follows:

On the day before the operation, usually in the evening after the patient has had a bath, a thorough cleansing of the face is made, especially of the lids with lukewarm water and soap, after which the conjunctival sac is thoroughly irrigated with a sublimate solution 1:5000 as also the lachrymal sac, to be followed with dressings of the same solution for an interval of half an hour over the eye. On the next day half an hour before the operation, the same cleansing and dressings are again used, and directly before the operation another irrigation of the conjunctival sac is made with the 1:5000 sublimate solution. A 2% solution of cocaine is used dropped into the eye three or four times during an interval of three or four minutes before the operation. The instruments are cleaned with hot water and soap, and then placed into a 3% carbolic acid solution. The hands are cleaned with soap and sublimate solution, 1:1000. During and after the operation, sublimate solution 1:5000 is used for cleansing the eyes. For a long time I have used throughout the operation only water physiologically sterilized by boiling, just as is used by Michel in his clinic, but I have again returned to the use of the sublimate solution, since on account of the difficulty of completely cleansing the conjunctival sac, I must acknowledge that, at all events, a sublimate solution of 1:5000 is more apt to render any existing germs innoxious than water sterilized by boiling, and furthermore the sublimate solution does not produce any noticeable injurious effects. The conjunctival catarrhs which sometimes follow the use of this solution are of no great importance, therefore I see no reason for discontinuing its use. In reference to the principles which are to guide us in regard to patients suffering with some disease of the lachrymal canal I shall not fail to speak. When purulent or muco-purulent secretion exists from the sides of the lachrymal sac or from an impassible stenosis of the canal, one accomplishes the best results by extirpating the lachrymal sac before the operation, and at the same time obliterating the canaliculi with the galvano-cautery as has been recommended for some time by Haab.

The question, shall we operate with or without iredectomy which has of late been discussed more than enough, is very easily answered. We should operate in all those cases without iridectomy in which we can determine with certainty that no disadvantage will be on our side, that is, in which we will have no prolapse of the iris to fear. Unfortunately in every case this is impossible to determine, and upon this vulnerable point all endeavors will have to fail in attempting to methodically extract all senile uncomplicated cataracts without iridectomy. Nor will even the most experienced operator be able to say before the operation that he will operate upon this or that eye without iridectomy or without a fear of a prolapse in the iris. This circumstance alone is enough for me to dissuade young ophthalmologists from at first performing extraction without iridectomy. A perfect iridectomy, without the entanglement of the pillars, undertaken finally after the expulsion of the lens necessitates a much greater display of operative skill than an iridectomy before the extraction, and furthermore it affords a much better chance for the prolapse of the vitreous. The presence of an iris prolapse depends more especially upon the form and structure of the iris, and less upon the manner in which the incision is made. Should the iris contract promptly after prolapsing, or should it contract just as promptly without prolapsing, or only after a gentle endeavor to replace the same following the expulsion of the lens, and should it furthermore show no tendency to such an accident even after the toilette has been made, then you can assert with safety, supposing that the patients will take proper care of themselves, that there need be no fear for any further accident in this direction. On the otner hand should the iris appear lax with no tendency to contract, and should it be necessary for you to make long and repeated attempts at its reposition, then you should never feel safe as to the final result even though the iris should finally be replaced. Everything may work beautifully at the time, but just as beautifully may there be a prolapse of the iris present the next day. In such cases, and especially those in which complete reposition will not succeed, I draw the iris out either directly after making the incision, or even after the expulsion of the lens, and proceed to make an iridectomy. The structure of the cataract itself has no influence upon the iris prolapse. A very important point for the prevention of a prolapse, is to cause a rapid closure of the wound which will thus quickly produce a deep anterior chamber. For this reason I lay stress upon the making of a conjunctival flap in your incision.

The question now arises: has the extraction without iridectomy real advantages over that with iridectomy, and why do some ophthalmologists hold such an exalted opinion for the so-called simple extraction? On the ground of my own observations, I may be permitted to say the following in regard to this point:

The simple extraction has certainly its advantages. Its chief advantage according to my judgment consists mainly in the absence of irritation during the process of healing. Irritative symptoms in the eye as a whole, but more especially in the wound and its contiguous parts, are as a rule very slight. A priori is this most likely to happen in simple extractions in that we have only one wound in this operation, while in the operation with iridectomy we have two. Furthermore this circumstance may also contribute a part in the result, viz.: that a healing with the lens capsule in the wound scarcely ever occurs in simple extraction, while in that with iridectomy it frequently happens. Contusion of the iris sometimes takes place in extraction without iridectomy, during the expulsion of the lens, yet this is never a cause of irritative appearances or complications, and one should never make an iridectomy simply to avoid the possibility of an iris contusion. A further advantage in the simple extraction consists in the retention of the naturally round pupil, an advantage which is chiefly cosmetic, but in some cases it may aid in making the vision more perfect, and in excluding the extra rays of light. But according to my opinion those which have been mentioned above are about all the advantages which could be enumerated.

On the other hand the simple method has also its shady side by no means unimportant. In attempting to generalize these we should never forget to mention prolapses of the iris, and a drawing in of the pupillary area towards the wound which always indicates a partial healing of the iris periphery between the lips of the incision.

Of prolapses of the iris all operators reckon from eight to ten and even more per cent., a right respectable number when you take into consideration, not to mention the unsightly appearances, the protracted course of healing, and the evil consequences that may arise therefrom. In his last article Knapp mentions the fact that in consequence of an iris prolapse, he lost an eye from suppuration, and in two other cases, each time both eyes, in consequence of chronic irido-cyclitis with the resulting sympathetic ophthalmia. Those are indeed sad experiences, and even the large number of round pupils have paid too dearly for these results! If such casualties befall an operator who has enjoyed such a rich experience in the field of simple extractions, how much more necessary is it for the young ophthalmologist to be on his guard both for the sake of his own interest and that of his patient. A further disadvantage in extraction without iridectomy consists in the difficulty of removing entirely the mass of cortical matter which remains behind, in consequence of which posterior synechia, and even secondary cataracts are more frequent than in extractions with iridectomy. For this reason it is more often necessary to perform discissions in the simple extractions than in those with iridectomy. I have previously insisted upon the fact that one should never undertake discission of a secondary cataract through the cornea but always through the sclero corneal junction. I have employed this method up to now in nearly a hundred cases, and from my own experience I can warmly commend the same. I must acknowledge that before this time discission was to me a very unpleasant operation, since in spite of its seeming simplicity and lack of danger, it frequently turned out by no means satisfactory, but often with irritative symptoms which continued for some time after the operation. Besides slight iritic symptoms, as well as the yet more frequent signs of glaucoma, there occurred very often a reaction at the point of puncture in the cornea, especially if at the time of the discission, an escape of the aqueous humor and prolapse of the corpus vitrei had taken place which would thus retard the healing process. If one further took into consideration how frequently simple abrasions and cuts of the cornea occasion long-standing troubles of the eye, and how much more easily these same injuries are subject to infection than wounds of the conjunctiva, then they would certainly shun the injuring of the cornea. Even other operators have sought to avoid this puncturing of the cornea. For this reason Kuhnt maks the discission, subconjunctival with a small knife especia ly devised for this purpose, while others make an incision with a lance shaped knife, and tear either through the secondary cataract with a hook, or simply cut through the same. Others again make the discission through the sclera. I make the operation through the sclro-corneal junction in all cases when possible with a long narrow, slightly conical cataract needle, just as was formerly used in couching, laying especial stress upon the fact that the needle should be as thin as possible, and gradually becoming thicker behind, because by this manner the escape of the aqueous humor is hindered. Signs of irritation after the operation are in the rule nil, and even glaucomatous symptoms seldom occur. I consider this slight modification in the operation as very important, and am convinced that discission through the cornea will be abandoned completely.

[I have not confined myself literally to the text throughout but have endeavored to make the article clear by the free use of English expressions whenever it was found necessary.—TRANSLATOR.]

The Grand.

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY OF THE BRITISH MEDICAL ASSOCIATION, BRISTOL MEETING, 1894.

[*Report continued from page 238, current volume.*]

THE TREATMENT OF TRACHOMA.

By DR. KENNETH SCOTT.

The author of the paper not being present, it was read by Mr. Johnson, the secretary. The author had treated twenty-six cases with the bichloride of mercury and the same number with the cyanide of mercury, with the view of deciding their comparative value. While he found these equally effective as to the length of time necessary for a cure, he favored the cyanide as more agreeable to the patients. He used the cyanide in a 4% solution once a day, applying it to the everted lids, and allowed the patient to use three times a day ¼% solution, dropping it into the conjunctival sac.

He did not look with favor on surgical treatment, such as scraping and squeezing. His experience was also against the use of silver nitrate.

DISCUSSION.

The discussion following the reading of Dr. Scott's paper was in part on his paper and partly on Mr. Juler's paper (See the abstract in December issue, p. 236).

Mr. Stephenson said he always found the gonococcus in purulent ophthalmia. The lymph follicles act as sentinels and may be found enlarged in both purulent ophthalmia and trachoma. This enlargement quickly disappears when due to purulent ophthalmia, but not so when caused by trachoma. A simple enlargement of these follicles in the lower cul-de-sac is often found in young children, which disappears after a while without treatment. As to the treatment of trachoma, he preferred the cyanide of mercury to the bichloride, but the remedy which he favored above all others was the sulphate of copper in stick.

Dr. Knapp said that there are two forms of trachoma. In the one form the trachoma bodies are numerous, and some of them large, while the inflammatory action is very slight. These cases should be treated by expression by means of the roller fórceps. The inflammatory form should be treated by silver nitrate, copper sulphate, or the bichloride. In these cases expression does not succeed.

Miss Ellerby, M.D.: My experience during four years' experience in Bombay, in the treatment of trachoma, fully agrees with Mr. Stephenson's remarks as to the efficacy of the use of the solid sulphate of copper. It was my practice, however, to apply it, not every day, but in the newer cases every second day, and later on, twice a week. I employed in the intervals, once or perhaps twice daily, a solution of sulphate of copper, two grains to the ounce in strength. The average time of cure in quite 90 per 100 of my cases was from two to three months.

As regards purulent ophthalmia, the cure of which is so complicated in eastern countries by the habits of the people and the bad hygienic conditions in which they live, I found the constant use of peroxide of hydrogen for cleansing and disinfecting purposes very efficacious. In conjunction with this I applied daily, or twice daily, a solution of nitrate of silver not stronger than four grains to the ounce—for the first two or three days, two grains to the ounce later.

Dr. Chisolm endorsed the use of hydrogen peroxide in the treatment of conjunctival inflammations. He related the case of a man who came to him to be operated on for cataract, but who was also suffering with chronic conjunctivitis attended by a muco-purulent discharge. He used on him the peroxide very freely and in one day the discharge ceased, and the cataract operation was done successfully.

Dr. Drake Brockman endorsed the old-time treatment of trachoma by copper sulphate. He treats his cases of catarrhal conjunctivitis with frequent cleansing of the conjunctival sac by means of syringing a very mild solution of the bichloride of mercury and using once a day a weaker or stronger solution of silver, as the discharge might be slight or profuse. As the cure advances he lessens the strength of the silver solution.

India is the stronghold of trachoma, but most of the cases are old before we see them Copper sulphate cures them in about six-months.

Surg. Capt. Fink had seen many cases of purulent ophthalmia in India, and had treated them with silver nitrate in strong solution, and had frequent cleansings. He treated his trachoma cases with the sulphate of copper stick.

Mr. John Griffith said that the diagnosis of inflammations of the conjunctiva by the microscope was hard to make. He had found lymphoid infiltration most common in trachoma, but the presence or absence of this condition cannot be relied on.

Dr. J. L. Thompson said that the late war in the United States had spread trachoma all over the country. As to treatment he said that recent cases could be cured by cleanliness and the use of boracic acid; that old cases were hard to cure by any or all means. In purulent ophthalmia his treatment was cleanliness and silver nitrate.

Dr. Knapp, in answer to a question, said that expression cures the non-inflammatory cases of trachoma and helps the cure in other cases, in which copper sulphate should be used.

Dr. Wallace Brown favored the use of copper sulphate in the treatment of trachoma. In acute cases he uses silver nitrate.

Mr. Doyne said that, in Oxford, there was but little trachoma. In looking over the record of 12,000 eye cases he found that there were but twenty-one cases of trachoma, and that nine of these cases had been imported.

Mr. Gillivray said that he used Knapp's expression forceps, first chloroforming his patients. He immediately rubbed into the denuded surface a solution of the bichloride 1 to 1,000.

Mr. Walker said it had been observed in Egypt that trachoma was more readily cured in hot than in cold weather. He supposed that this was true as to all countries.

Dr. Chisolm said there are 70,000 negroes in Baltimore, and there is not one case of trachoma among them.

Mr. Ernest Clark read a paper on the

ASSOCIATION OF BLEPHARITIS WITH ASTIGMATISM.

He gave statistics showing the frequency of this association. His conclusion was that the refractive error was a causative agent, and that to cure the disease the error must first be corrected.

The next paper was by Dr. George M. Gould, on

LOW DEGREES OF EYE-STRAIN A SOURCE OF SYSTEMIC DISTURBANCE.

The author taught that when the error of refraction is slight, the ciliary muscle makes a more determined effort to correct it than when the error is great. This effective effort though slight, if long continued, brings on fatigue and the various nervous phenomena with which all are so well acquainted. Without dealing largely in statistics, the author presented many strong arguments in favor of earnestly searching for, and correcting, the slight errors of refraction, and the low degrees of heterophoria. But, in no sense, did he teach that the greater errors should be allowed to go uncorrected.

The next paper was by Mr. Jno. Griffith on the

SECRETORY FUNCTION OF THE CILIARY BODY.

This paper has already been published in full in this journal, page 201, No. 6, of the current volume.

Dr. Herman Snellen, in a paper on

KERATITIS PUNCTATA,

stated that he had found a peculiar micro-organism which he believed to be the specific cause of the disease. In his investigation he had removed some of the deposit on the posterior surface of the cornea through a puncture which he had made for the purpose.This deposit he had studied under the microscope with the result of finding the microbe.

In discussing this paper Dr. J. L. Thompson said that he looked on the disease as one remarkably dangerous.

Dr. Knapp expressed himself as astonished, and stated that no microbes had ever before been found in a normal secretion.

Mr. Wray read a paper on

MIXED ASTIGMATISM.

He thought it a condition far less common than was generally supposed. Most cases so recorded, if more thoroughly investigated, would prove to be cases of hyperopic astigmatism simple or compound. Knowing, as he must, that a mydriatic alone could clear the diagnosis, he, nevertheless, expressed himself against its use.

Dr. S. J. Taylor reported a case of probable disease of the lenticular ganglion.

Mr. McGillivray read a paper advocating the use of cold applications in the treatment of ocular inflammations.

Mr. Thompson, Secretary of the Section, reported a case of sloughing of the cornea, occurring in the course of an attack of jaundice which terminated in death.

Mr. George Walker spoke of corneal ulcers requiring surgical procedure. He had devised an operation safer and better than the one known as Saemesch's operation. It consists of scleral punctures at short intervals near the corneoscleral junction and in front of the iris, throughout the greater part of, if not the entire, circumference. He said that he had done this operation frequently in cases of interstital keratitis with most satisfactory results.

Dr. Reeve thought that, in addition to the punctures, the corneal ulcers should be treated.

Dr. Stephenson reported a case of orbital cellulitis following Mules operation. He had done the operation thirty times, twenty-nine of the cases doing well. In the case followed by cellulitis he was forced to remove the stump.

Dr. Robt. Ruttles, at the close of the session, gave an epitome of his paper on tumors of the eye and orbit.

SECTION OF OPHTHALMOLOGY, A. M. A., BALTIMORE MEETING.

The Secretary of the Section on Ophthalmology of the American Medical Association has received a large number of contributions to the program, which make it probable that the sessions of this Section will be especially interesting and profitable. Members of the Association who are desirous of contributing to the work of the Section, should forward the titles of their papers at an early date, in order to secure a place before the program is filled. The Chairman, Dr. Edward Jackson, writes that he has arranged symposia of ten minute papers on "Plastic Operations about the Eye," and "Operations upon the Ocular Muscles," which, with the report of the committee on "Examination of the Eyes of School Children," will be of special interest. Those preparing contributions should remember that only brief, practical papers upon subjects of real value should be brought before such a representative body as the Section on Ophthalmology of the American Medical Association.

H. V. Wurdemann,

805 Grand Ave., Milwaukee, Wis.

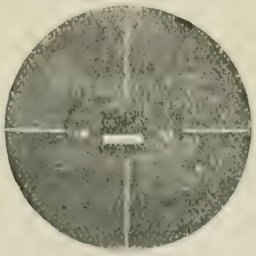
MODIFICATION OF "THE MADDOX ROD."

By J. FREDERICK HERBERT, M.D., Philadelphia, Pa.

One of the best and simplest means at our command for testing the equilibrium of the ocular muscles is the Maddox Rod, and to make same still more delicate, I have suggested several changes or additions.

1st. The rod should be made of *red* glass, and should be cut in half longitudinally, so that it is really a very strong cylinder. The red streak is more easily seen by the patient, and does away with the necessity of a plain red glass for the other eye.

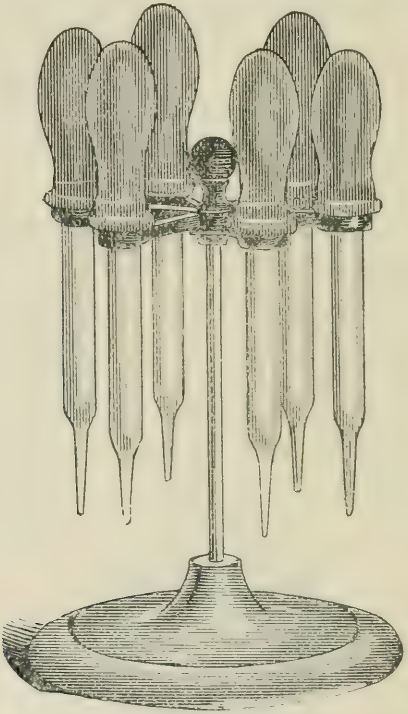
2d. By placing a stenopaic slit not over two millimeters long behind the rod, increases the delicacy of the test, as it prevents the person being tested from moving the head about as they must direct their eye through the central opening, as it also cuts off all superfluous light. Care should be taken that the slit covers the rod in all directions, so as not to admit any extraneous rays.



3d. The disc on which the rod is fastened has a milled edge which facilitates the rotation in the trial frame, and on the face or flat surface of the disc are two broad, white lines indicating the horizontal and vertical positions of the streak. The advantage of this can readily be seen, as the rod can be placed properly without the loss of time.

PIPETTE HOLDER.

The advantage and usefulness of the holder needs no special comment, the illustration speaks for itself. It will be apparent to all that it fills a long-felt want to the armamentarium of the oculist. It will be a great convenience to the busy man, as it can always be kept "*in sight*," and will save the trouble of looking for a pipette, which was hastily thrown on the table or desk only to be buried under a lot of books or papers, and certainly a cleanlier way to keep them. The holder consists of a base with an upright bar from which extend the arms terminating in loops which form the receptacles for the pipettes. The rubber tips on the droppers are made of white, black, and red rubber, merely so arranged for convenience sake. One color can be used for mydriatics, another for cocaine, etc., etc.



The rod and holders are made by Messrs. Reimold & Meister, 41 N. 13th st., Philadelphia, Pa.

1313 Arch St.

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY, A. M. ASSOCIATION, SAN FRANCISCO MEETING, 1894.*

[*Continued from page 274, current volume.*]

ASTHENOPIA.

By C. M. HOBBY, M.D., Iowa City, Iowa.

The substance of this paper can be gotten from the few quotations that follow:

"Asthenopia is to the visual function what dyspepsia is to the digestive, a congeries of symptoms differing somewhat according to the pathologic views of the physician in charge, and often like dyspepsia cured by the physician instead of by the prescription. As ordinarily employed, without reference to pathology, it comprises several groups of symptoms following the more or less prolonged use of vision at short range, but it is sometimes made to cover uncomfortable vision at all distances; the same symptoms occurring to a presbyopic patient are not usually considered asthenopic, although some logically include unrelieved presbyopia with asthenopia. Not infrequently reflex disturbances, unconnected with the visual organs, are considered as asthenopic phenomena; blepharitis marginalis, which is apparently frequently caused by refractive errors, and mild forms of conjunctivitis, are sometimes considered as symptoms of asthenopia rather than as causes for the ocular discomfort. Accepting hyperopia, especially when associated with astigmatism, as a cause for headaches, and even of the more violent migraines and hemicranias, and believing, as we may, that epileptic attacks have ceased after the correction of refractive error, do we not recognize under all these circum-

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*This report is taken largely from *The Journal.*

stances that the refractive error is only one factor in the cause, and that back of all there exists a predisposing systemic condition?

"It would be of decided advantage if the term, asthenopia, could be restricted in its meaning to the effects produced by the use of one or both eyes burdened by some abnormal increase in the muscular labor of vision, that is, some burden upon the accommodative function, internal or external; but the symptoms called asthenopic occur in perfectly normal conditions, at least so far as the visual organs are concerned, and we are compelled to consider these cases with others.

"When we come to consider the great number of cases who have defective vision, from refractive and other causes, but who never complain of those symptoms called asthenopic we are forced, I think, to the conclusion that asthenopia indicates inadaptability to environment, and that it is the individual and not the eyes that are asthenopic. What is true in regard to errors of refraction is apparently true of the so-called muscular asthenopia; while records of heterophoria are not so extensive and the observations made lack the ripening effect of time, and while as in astigmatism of low grade the subject of heterophoria does not consult the physician unless there exists some form of uncomfortable vision, enough observations have been made to show that heterophoria without asthenopic symptoms is sufficiently common, and to lead to the belief that it is not to the muscular insufficiencies alone that the occurrence of asthenopia of the variety termed muscular is to be attributed.

"As asthenopia is not a necessary result of any of the various conditions to which it has been attributed, and is yet often cured or materially improved by relief or attempts to relieve real or imaginary causes of increased effort, or by training the internal or external muscles of the eye, as well as by systems of muscular exercise, we cannot do too much towards establishing some basis for efforts at relief that shall be less empirical, without substituting a dogmatic physiology of the function of vision. And it is well at this time to protest against the tendency to consider everything connected with the visual organs, as governed by inflexible mathematical formulæ. The evidence is not in, which compels us to believe that the muscles of the eye are innately endowed with certain coördinative functions, or that they have a brain center which is prepared to correlate their movements without the necessity of the training that experience gives, or that their functional activity is exerted under different laws from those governing the rest of the muscular system. It may be believed that the coördinated movements of the muscles of the eyes to perform a given task is the result of the same kind of practice, the same kind of training that pursued through a long time gives to the fingers and hands of the typesetters or the musician their distinctive skill, the same kind of training and experience that the babe must go through with before standing on its feet and walking.

"A man accustomed to the work may saw wood for ten hours, a woman may busy her fingers in knitting for the same length of time; but the man, unaccustomed to the saw, would soon find back and arms complaining of the unwonted labor, and the inexperienced knitter would soon feel fatigue in the fingers. The same is true with those who attempt to use the eyes at a new and prolonged tasks; the adult whom will or circumstances kept from studious habits in early life, suddenly attempting to make up lost time; the woman who is suddenly deprived of her means of support and who attempts to gain her livelihood by sewing; the active man who attempts to confine himself to book-keeping; all of these are likely to exhibit asthenopic symptoms whether they have refractive error or not. Correcting visual disorders is of undoubted service to them but complete relief awaits their adjustment to environment."

[*To be continued in next issue.—Ed.*]

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G. C. SAVAGE, M.D., Editor and Publisher,
621½ CHURCH STREET, NASHVILLE, TENN.

The Royal Eye Hospital, London.

The institution named above is new, and its location is south of the Thames, not a great distance from Spurgeon's Tabernacle. It is the most complete eye hospital that the writer has ever seen, and its daily clinics are very largely attended. Mr. McHardy and his associates are full of courtesy, and are always glad to have foreign oculists visit them. No reader of the RECORD ought to go to Europe without a determination to visit this hospital.

Eighth International Congress of Ophthalmology.

The excellent report of this meeting, a part published in the last issue, continued in this number, and to be completed in the March issue, was intended, at first, for publication only in the *Buffalo Medical and Surgical Journal.* Learning of Dr. Hubbell's intention to write the report, we at once asked him to get the editor of that journal to give his consent to the republication of same in the RECORD. In due course of mail a letter came from Dr. W. W. Potter, the enterprising editor, granting our request. In this connection we take pleasure in stating that Dr. Potter is a live, wide-awake man at the head of one of the best monthly journals published, over the pages of which no Doctor can even glance without being benefited.

The Baltimore Meeting of the American Medical Association.

No meeting of the Association of recent years has been more largely attended than will be the one to be held in Baltimore. The scientific work to be done there will compare well with that of any of the past meetings. Officers of all the Sections have been active in collecting material for presentation. Especially is this true of Dr. Edward Jackson, Chairman, and Dr. H. V. Würdemann, Secretary of the Section of Ophthalmology. Read the Secretary's notice in this issue.

Thirty-six papers have already been promised Drs. Jackson and Würdemann, but there is still room for a few more. We hope to be able to present the program to our readers in the next issue, or, at latest, in the April number.

Section of Ophthalmology of the British Medical Association.

In this issue we conclude the report of the Bristol meeting, which we had the pleasure of attending. We hope that the imperfect report that has been given has been helpful to at least some of our readers. The meeting was a very pleasant one, and, what is better, it was profitable. One from America had a very home-like feeling, for his American colleagues were there in numbers. At one time there were thirteen of these in the hall. Several, as the report shows, read or discussed papers.

The profession and people of Bristol were very kind to the foreign visitors. Most of us will ever remember pleasantly our short stay in that old city. The editor of this journal feels especially indebted to Mr. Cross, President of the Section, and to Mr. Craig Smith, the noted surgeon, for courtesies shown him and his friends. Should we go to Europe again we would feel much inclined to revisit Bristol.

Our Advertisers.

On page 2 of the cover will be found the advertisement of that well known firm W. H. SHIEFFELIN & CO., OF NEW YORK. Some of the drugs they offer to the profession are indispensable to the ophthalmic surgeon. Most of the RECORD's readers have often prescribed Aristol for the several conditions in which it is indicated.

On page 3 of the cover one of the best railroads in the South has its ad. THE NASHVILLE AND CHATTANOOGA R. R., from Nashville to Atlanta, will be pleasantly remembered by our Northwestern and Western confreres, who have made one or several trips over it when going to Florida for a vacation. On the same page will be seen the picture of the NICHOLSON

House, Nashville, new and newly furnished, where Doctors, and especially friends of the Record, are always treated with the kindest consideration.

On the last page of the cover will be found the changeable ad. of the Geneva Optical Co., of Chicago, whose many devises for aiding the oculist are already well known. One of the latest and best is their Optomyometer, and instrument with which any muscular error may be quickly detected and accurately measured. It is a perfect instrument for determining the existence and quantity of cyclophoria (insufficiency of the obliques). A cut of this will appear in an early issue.

Turning to the inside pages, the changeable ad. of Reimold and Meister, of Philadelphia, will be found on page I. In former issues the convenient and useful instrument for determining Heterophoria and the anomalies of refraction, devised by Dr. J. Frederic Herbert, has been placed before you. We have one and would not like to be deprived of its use. In this issue they show their New Trial Frame, and a very simple, cheap and accurate perimeter.

Page II is reserved for the ad. of one of the best Medical Colleges in this country.

Page III is occupied in part by the ad. of J. Fehr's Comp. Talcum Baby Powder, widely known and extensively used. Our observation convinces us that it is very useful. The remainder of this page shows Wotten's Current Converter, which, as the readers of the Record have already been assured by Dr. A. G. Hobbs, is a simple and practical apparatus.

Page IV is occupied by one of our local jewelers, and two local drug firms, each first-class in his line, and all of them interested in the prosperity of the Record.

On page V will be found the ad. of Miner and Elbreg, of Indianapolis, whose Perfection Chair "stands at the head of the list" of surgical chairs. We have been using one six years, and when it wears out we propose buying another just like it, plus some later improvements.

On page VI F. A. Hardy & Co., of Chicago, who need no laudation from us, for their works do praise them, show you their improved Javal Ophthalmometer for which they claim several points of advantage, clearly set forth in their catalogue. As to their prescription work, our personal knowledge, extending now over many years, enables us to say they are pains-taking and accurate.

The permanent place for the price list of reprints from the Record is on page VII. On the same page will be found the advertisement of A Practice for Sale.

On the last page (VIII) is the ad. of the Jackson Seating and Cabinet Co., one of their specialties being a Throat and Nose Cabinet, one of which we have and enjoy.

THE
OPHTHALMIC RECORD.

VOL. IV. MARCH, 1895. No. 9.

THE EIGHTH PERIODICAL INTERNATIONAL OPHTHALMOLOGICAL CONGRESS, HELD AT EDINBURGH, AUGUST 7-11, 1894.*

By ALVIN A. HUBBELL, M.D., Buffalo, N. Y.

(Concluded from page 293.)

PRIESTLY SMITH (3) had done the scleral punctures as an adjunct to iridectomy in the treatment of glaucoma fifty times in non-congestive cases under cocaine anesthesia, in others under chloroform. A valvular puncture is made with a von Graefe's cataract knife introduced through the sclera at least five millimeters back of the corneal margin and then rotated and removed. A small leaking puncture remains. No internal hemorrhage has ever occurred. After iridectomy it prevents the lens being pushed forward; before iridectomy it has the same effect. It may be of use in some cases where iridectomy is inadvisable.

Abadie said that he had seen many glaucoma patients subjected to sclerotomy, but not one had ever been definitely cured, while iridectomy had preserved the sight of many. He accepted Priestly Smith's method of puncture as a means of facilitating iridectomy, but without attributing to it any curative value.

Parent had had recourse to puncture of the sclera several times and always with complete satisfaction.

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*With the consent of Drs. Hubbell and Potter, this report is republished from the *Buffalo Medical and Surgical Journal.*

Pflüger had for several years used posterior sclerotomy in severe cases of glaucoma as a preliminary to iridectomy, and his experiences coincided precisely with those of Priestly Smith.

McHardy, of London, had found the iridectomy complicated and not facilitated, immediately after the scleral puncture, from the marked softening that the latter produced. He made very large iridectomies in glaucoma and in the malignant form he obtained successful results by extracting the lens.

Power had performed an operation which he said was almost identical with that of Priestly Smith and which was originally proposed by Mr. Hancock, of the Royal Westminester Ophthalmic Hospital. It was done with a Beer's knife, which was passed into the vitreous through the sclera three or four millimeters from the margin of the cornea. It is in acute glaucoma that it is most successful. He had almost given up operating in chronic glaucoma.

Menacho had practised the old posterior sclerotomy and was satisfied that it was efficacious in relieving the acute symptoms of glaucoma.

Priestly Smith concluded the discussion by reminding his hearers that his paper referred to scleral puncture as an *adjunct to iridectomy* and not as an independent operation. The withdrawal of a small quantity of fluid from the vitreous chamber does not, cannot, in fact, immediately alter the depth of the anterior chamber.

Mules (6 *a*) had performed a new operation for ptosis, in which a small elliptical piece of cartilage is removed, and by wires, carried to half an inch above the eyebrow, the lid is drawn up to the required degree.

Little had seen the good results in a case operated on by Mules.

Pfluger (7) recommended drainage of the anterior chamber in infections of it, as well as in keratoconus and in some cases of glaucoma and detachment of the retina. He uses a small piece of guttapercha in the form of a cross, the short part being introduced through an opening in the cornea to the depth of about two millimeters into the anterior chamber. The other parts are fixed under the conjunctiva. If injections into the anterior chamber are necessary, this drain must be frequently changed. In conical cornea it may remain several days and its use should be often repeated.

Walker (8) had devised the following operation for relieving tension in chronic glaucoma: Dissect a small flap of conjunctiva about three to six millimeters close to the edge of the cornea; then thrust a small knife, with the base toward the iris, into the anterior chamber at the margin of the corner and into this opening push the conjunctival flap.

The epithelial surface of the conjunctiva not uniting with the cornea, a permanent fistula and continuous drainage are established.

Landolt (28), after twenty years' attention to strabismus, had come to the conclusion that, in its correction, muscular advancement was better than tenotomy. After tenotomy the excursions of the eye are often limited, the caruncle often becomes retracted, the power of the operated muscle weakened and the eye sometimes has the appearance of being more prominent than the other. On the other hand, advancement gives results as good and complete without any of the drawbacks of a tenotomy and it is without danger. For example, there is no risk of over-correction, no insufficiencies, no retraction of the caruncle and no malposition of the eyeball.

In convergent strabismus he preferred to simultaneously advance both external recti muscles and follow the operation by orthoptic exercises. In muscular insufficiencies or slight strabismus a unilateral advancement would be sufficient. In divergent strabismus a tenotomy of the external rectus gives only a metric-angle of correction, while a complete correction may be obtained by advancement of the internal rectus.

It is only in high degrees of strabismus that he combined a tenotomy of the antagonistic muscle with an advancement, and then the tenotomy is done sub-conjunctivally and without further detachment from the surrounding tissues.

Swanzy did not think that simple tenotomy should be discarded in favor of advancement to the extent recommended by Landolt. He believed the rules of von Graefe still hold good. He never used advancement alone, but frequently combined tenotomy with it in extreme cases. He found difficulty in deciding how much of the tendon should be removed to produce the desired effect. He also found that advancement sometimes causes disfigurement by reason of an unpleasant red lump being produced at the point of the new insertion. Does Landolt have any difficulty in securing a flat cicatrix?

Pannas was of the same opinion as Landolt in regard to the superiority of advancement, especially in cases due to paralytic insufficiency. In concomitant strabismus, on the other hand, in which the equilibrium is not disturbed by paralysis or retraction, but by insufficient convergence, tenotomy is more certain. Advocates of advancement admit that it frequently fails to afford relief in the divergent strabismus of myopia. For these reasons he employs advancement merely as an adjuvant to tenotomy in marked divergent and in acute paralytic strabismus.

Roosa had used the method of advancement as a substitute for, or as an adjuvant to, tenotomy in very high degrees of convergent strabismus, or when one or more tenotomies had been performed. But to substitute advancement for tenotomy on account of the danger of diplopia, was to make a change from a slight to a more serious operation. Advancement should not be used as a general [substitute for] tenotomy. All refractive errors should be corrected.

Gruening, of New York, endeavored to avoid the more serious operation of advancement and obtained very satisfactory results, even in divergent strabismus, by the simple operation of tenotomy.

Stevens said that equality of rotation in all directions must be maintained in order to obtain the best results in strabismus operations and the perfect union of images in all positions. To maintain such equality, relaxation of corresponding muscles must be made. Tenotomy of one muscle and shortening of its opponent of the same eye is inconsistent with this principle. He believed that in most cases of strabismus the defect may be relieved and binocular vision obtained with perfect rotation in all directions by carefully graduated tenotomies on both eyes to be repeated after some months. But in every case the various forces are to be regarded.

Landolt replied that the criticisms of his esteemed colleagues proved that they do not examine, treat, operate or follow up their patients as he had done. Not one, for instance, had mentioned the measurements of the excursions of the eyes, of convergence, or of divergence, before or after operation. Yet this should be done. He agreed that great stress should be laid upon the correction of optical defects in the cure of strabismus. Operation is not sufficient to do away with a squint, but is only a step in a long and carefully directed orthoptic line.

Thier (31) had operated on thirty-eight cases of high myopia by discission and absorption of the crystalline lens. He passes the knife through the whole thickness of the lens and the posterior capsule. Rapid swelling of the lens is desired, and if cloudiness and swelling do not develop within eight or ten days he repeats the discission. Young patients are most suitable, but he had operated in one case successfully at forty-eight years of age.

He had operated on thirty-eight patients. In eleven he had operated on both eyes, and in sixteen on one eye. In nearly all a marked improvement of vision had been produced.

Fukala (32), in speaking on this same subject, said that he operated by discission and followed this by paracentesis and evacuation of the lens. He operated on all suitable cases under forty years of age, avoiding those affected with chronic choroiditis or detachment of the retina. He was opposed to the immediate extraction of a transparent lens, as he thought it liable to be followed by a dangerous hyperemia of the choroid.

Schmidt-Rimpler (Göttingen) considered it necessary to watch the patients for a long time after one of these operations. In one case, operated by discission on one eye, the myopia had progressed in the same manner in the aphakial eye as in the other, with the development of the same choroidal lesions. From this he concluded that, in young persons, the double operation was preferable.

Pflüger had operated on forty cases with good results. He differed with Thier and Fukala in believing that choroidal changes are not a contra-indication. There are few cases of high myopia without them. He does not dare to divide the lens as deeply as does Thier, for the vitreous humor might pass into the anterior chamber and out through the corneal wound. The tension should be watched after discission, and if it occurs it may be controlled by repeated paracentesis.

Thier, in reply, said that with good antisepsis he had little fear of the presentation of the vitreous outside, and the large discission hastened the termination of the treatment and left an unobstructed pupil. Furthermore, the contraction of the capsule, which might otherwise occur and cause irritation, is prevented.

Fukala said that, as a contra-indication to the operation, he referred to those choroidal changes which affected the macula and those which caused numerous exudates into the vitreous.

Noyes (33) described an operation which he had performed in a case of closure of the pupil from irido-cyclitis after cataract extraction. With a von Graefe's cataract knife he makes a section on each side of the cornea,and before withdrawing the knife plunges the point into the iris near the center. If there is hemorrhage he injects into the anterior chamber saline water by one of these openings and out by the other. When the hemorrhage ceases, he incises the iris with de Wecker's scissors, on both sides. The hemorrhage is again treated by saline injections into the anterior chamber, as before. Finally, the flap of iris is drawn out, on either side, by a hook and cut off.

Darier referred to a similar operation which had been done by Abadie, in which the iris was incised in the form of a V and the iris flap drawn out from the opposite side and cut off.

McHardy (41) reported the results of treatment of immature cataract by preliminary iridectomy with trituration of the lens. He had had three different series:

	1st Series.	2d Series.	3d Series.
Number of cases	25	100	49
Unduly early extraction required	4 per cent.	2 per cent.	4 per cent
Second and third trituration required	28 " "	9 " "	4 " "
Troublesome, but controlable, iritis	12 " "	17 " "	2 " "
Slight loss of vitreous during extraction	28 " "	Not noted.	4 " "
Total failure to restore sight	None.	3 per cent.	None.

Comparative observations were also made in cases in which a preliminary iridectomy had been done with and without trituration:

	With Iridectomy.	Without Iridectomy.
Cases	38	21
Cortex semi-fluid, non-sticky	80 per cent.	———
" sticky	None.	33 per cent.
" hard	20 per cent.	66 " "
Cystoid cicatrix	3 " "	10 " "
Secondary capsulotomy	21 " "	35 " "

He had been using this method of trituration of the lens for nine years. He obtained complete ripening in immature senile cataracts in from eight days to eight weeks, and the procedure was a safe one. He has the eye well under the influence of atropine at the time of the preliminary operation. After waiting six to eight weeks, he extracts with as much safety and as good results as in cases where the maturity was spontaneous, and it was free from the evil effects which follow the removal of immature cataracts.

Noyes believed there was a place for trituration of immature cataracts. He found the indication in cases of soft cataracts, with broad striæ, which, if operated on, would leave a large quantity of cortex behind to excite iritis and produce a bad secondary cataract. But this trituration and maturation can be perfectly well done without iridectomy. Within the past five years he had operated on cases of sclerosed lenses, regardless of the amount of transparency, and he had found that where sclerosis of the nucleus could be discerned, the cortex was as perfectly evacuated as if the whole lens were opaque. The incision included almost half of the cornea, no iridectomy was done, and, if some obscurity resulted, irrigation with a warm physiological solution of common salt cleared the pupil. The stream was directed by a rubber bulb, without introducing its point into the wound. He felt less anxiety, however, in a case in which the lens was fully opaque.

Hill Griffith, of Manchester, had employed trituration with advantage, and recalled some of his experience.

Theobold (43) advocated the use of large probes in the treatment of strictures of the nasal duct, and described his probes and his method of using them, all of which has long been familiar to American ophthalmologists.

Grüning had had excellent success with Theobold's probes, and confirmed Theobold's experience.

Roosa was not in favor of Theobold's method exclusively. Many cases are purely those of catarrh, and not of stenosis, and very little and simple treatment is often all that is necessary. He was well satisfied with his own results in employing Bowman's method, with such deviation as would suggest itself to an intelligent man.

Thompson, of Indianapolis, had treated such cases during the last twenty-three years by all sorts of methods. He began with large probes about fourteen years ago and had used them in every way, frequently and less often, and in some instances "large enough for a horse." Yet he has had patients return in less than a year, sometimes earlier, with the ducts just as small and the disease as bad as before treatment.

Risley, of Philadelphia, thought the treatment by large probes was opposed to the normal physiological process. An opening in the canaliculus sufficiently large to admit the largest of Theobold's series, destroyed the physiological relation and function of the parts. The lachrymal duct, in its normal condition, is a capillary tube and not a drain-pipe.

Chibret, in view of the fact that probing does not cure all cases of epiphora, had found much relief in diminishing the amount of secresion by ablation of the inferior lachrymal gland, according to the method of de Wecker. This reduced the secretion to one fourth.

Priestly Smith favored wearing for long periods lead or silver probes, with the upper end bent so as to lie in the open canaliculus.

Lee, of Liverpool, recommended prolonged irrigation of the lachrymal passages, through a perforated tube, with some antiseptic fluid, particularly in blennorrhea of the sac and duct.

Argyll-Robertson said that he had been personally cognizant of the employment of very large probes for eighteen years, which were introduced by Mr. Couper, of London, and he thought that such credit as attaches to this procedure should be given to him.

Theobold closed the discussion by saying that relapses undoubtedly occurred after treatment by his method, but such relapses were extremely rare. He thought their employment did not destroy the drainage-function of the passages.

Stoelting (44) had performed repeated sclerotomies for hydrophthalmia, the patient being under chloroform anesthesia to prevent all sudden movement. The eyes are then bandaged closely, the first time for three days, and the second for two days, each time under chloroform. On the fifth day myotics and cold compresses are used. For each eye two sclerotomies were necessary. The process of cure lasted on an average fifty days.

Gutmann believed congenital hydrophthalmia is curable, if an operation is done early. He had found better results from iridectomy than sclerotomy.

Pflüger had been unfortunate in operating on many cases. The only case in which the cornea returned to its normal size and transparency, as well as function, was treated by sclerotomy, but as a routine method this operation cannot be recommended.

Thier thought good results could be obtained not only from iridectomy, but also from sclerotomy.

Dufour believed that, if the intra-ocular pressure could be reduced, even for a short time, the hydrophthalmia would be relieved. Myotics would sometimes do this; but if they failed, an operation would be necessary.

MALGAT (45) had concluded that medical and hygienic treatment of conjunctival granulations were as imperative as surgical measures. For the surgical treatment he employed electrolysis, using a simple Gaiffe battery of seven pairs, provided with a rectilinear collector. The conductor carrying the needle is connected with the negative pole. With this every granulation (trachoma) is destroyed by applying the point of the needle successively to each one. Several sittings are required at intervals of two or three days. It is necessary to reverse the upper eyelid so as to expose the upper retrotarsal fold or resort to excision of it. The conjunctiva becomes smooth and normal without a trace of cicatrization. The electrolysis acts chemically, antiseptically, and as a means of modifying diseased tissues.

Chibret had investigated the etiology of trachoma for twenty years, and he believed that sun and air had nothing to do with its production, but that it was principally a disease of race, as had been shown by Swan Burnett, Hirschberg and himself.

Chavallereau (47) submitted a paper describing two cases in whom paralysis of the ocular-motor nerve persisted eight months and six and one half months, respectively, in spite of medical treatment. He cut the external rectus muscle in each case and the paralysis entirely disappeared.

MISCELLANEOUS PAPERS.

Leber (23) recommended a new method of hardening and preserving eye-specimens by means of formol. The active principle of formol is formaldehyde, which is dissolved in water, to which is added a little methelic alcohol in the proportion of 40 to 100. To harden an eyeball the formol should be mixed with ten to thirty parts of water, the best proportion being about one to ten. Formol had been recommended the year before by Dr. F. Blum for the preservation of vegetable and animal substances, and later by Dr. Edinger for the eyes.

Formol has no attraction for water, hardens tissues by coagulation, and no shrinking takes place. It acts as a fixitive for histological structures, requires a very short time (from one to a few days), the colors, and even a part of the transparency of the media are preserved, the vitreous remains transparent and keeps its normal consistence and the common procedures of staining and embedding in celloidin, or paraffin, can be applied as well as after hardening in Müller's fluid, or by other methods, and no washing out of the hardening substance is necessary. After hardening, the specimens can be preserved in the same fluid, or they may be mounted in glycerine jelly.

Swan Burnett (35) defended that system of measuring and designating prisms which made the prism-diopter (P. D.) or the centrad (Cr.) the standard or unit. He suggested as an exponent the sign △, instead of that of the degree (°).

Savage (48) read a paper on the relation of oblique astigmatism to the oblique muscles of the eyes and gave practical demonstrations of the principles for which he contended. This subject is so new and its importance seems so great that quite a full abstract is hereby submitted.

The simple function of the oblique muscles is to counteract the torsion effect of the action of the superior and inferior recti and also of the external and internal recti, if by malposition these are inserted too high or too low. In other words, their function is to keep the normal vertical meridian of one eye parallel with that of the other in obedience to the law of corresponding retinal points. In oblique astigmatism the retinal images are distorted, and in obedience to the same law, the oblique muscles are further brought into action to harmonize the retinal images. Thus when the meridians of greatest curvature diverge above, the superior obliques make the effort to harmonize the images, and when they converge above, the effort falls on the inferior obliques.

In applying a cylindrical glass for the correction of astigmatism, whether myopic or hypermetropic, there is in every case an arc of distortion for the superior obliques, and also an arc of distortion for the inferior obliques. These two arcs always make 180°, but are not always equal. They are equal only when the axes of the cylinders are required at 90° or 180°. For plus cylinders the arc of distortion for the superior obliques is always wholly or in greater part in the lower temporal quadrant, while the arc of distortion for the inferior obliques is always wholly or in greater part in the lower nasal quadrant. The reverse is the case with the minus cylinders. The arc of distortion for the superior obliques is not always equal to the arc of distortion for the inferior obliques, but the one always supplements the other so as to make 180°. To illustrate: If the arc of distortion for the superior obliques is 120°, that for the inferior is 60°. The point of maximum distortion in either of these arcs is just 45° from the vertical. The practical feature of this matter resides in the fact that we have within our power, by temporary rotation of cylinders, either plus or minus, in the proper arc from 5° to 10°, to relieve the patient of metamorphopsia and other uncomfortable symptoms which are so common in the great majority of cases of oblique astigmatism. Gradually these cylinders must be rotated back to the proper point, when the patient will remain comfortable. This is of special importance in cases where the obliques are insufficient. As the author of the paper has before stated, insufficiency of the superior obliques is a very common condition, therefore, whenever oblique astigmatism is such as to call into activity the inferior obliques, it becomes a matter of very great importance in correcting this condition, to resort to the rotation of the cylinders so as to gradually transfer work from the inferior to the superior obliques. To illustrate: We have a case of hypermetropic astigmatism of 2. D., the meridians of the greatest curviture converging above. This uncorrected astigmatism distorts the images so as to throw a greater amount of work on the inferior oblique muscles. Correct this astigmatism by a plus cylinder, the distortion is at once relieved, and the work to which the inferior obliques have been accustomed is at once transferred to the superior. The latter being weak, they do not take this extra work kindly. By revolving the axes of these cylinders towards 90° for each eye, through an arc of 5° or 10° the images are distorted in the same way that the astigmatism itself distorts them, but objects are seen more sharply than if the lenses had not been given. This artificial distortion while sharpening the images leaves an excessive amount of work to be done by the inferior obliques. Gradually the cylinders are revolved back to their proper positions, and in this way, by small degrees, the work is transferred from the inferior obliques to the superior.

INSTRUMENTS.

Darier (13) exhibited aseptic collyria, an aseptic case for dressings, and a form of instrument for the shadow-test.

Risley (38) also showed an apparatus of his own construction for the shadow-test.

Ayers (39) presented a forceps for removing tarsal cysts and granulations of the conjunctiva.

THE NEXT MEETING OF THE CONGRESS.

After the conclusion of the reading of the papers, the congress then took up for consideration the question of the place and time of the next meeting. Prof. Snellen, on behalf of his Dutch Colleagues, invited the congress to hold its next session in Utrecht, Holland, and assured the members that they would do all in their power to make it interesting and profitable. He proposed that it be held in about five years hence, but at such a date that it would not clash with the meeting of the International Medical Congress.

Dr. Meyer, of Paris, said he had been commissioned by the Ophthalmological Society of Paris, and also by his French colleagues, to invite the congress to hold their next session in Paris in 1900, when the great international exhibition would be open in that city. Meetings of many other scientific bodies would be held at that time, and he thought it would be a good time and place for this congress. He could assure the congress of a most cordial and fraternal welcome.

Prof. Hansen-Grut, of Copenhagen, seconded the proposal of Dr. Snellen. He was afraid, if they were in Paris in 1900, there would be so many things to be seen outside that very little work wonld be done by the congress.

On putting the question to vote, the invitation and proposal of Prof. Snellen were accepted.

Prof. Snellen thanked the congress for this decision, and named as associated with himself on the committee of organization, Dr. Hansen-Grut, of Copenhagen; Dr. Doijer, of Leyden; Dr. Argyll-Robertson and Dr. Berry, of Edinburgh.

CLOSING OF THE CONGRESS.

At this point Dr. Noyes, of New York, took the platform, and, in a felicitous speech, proposed that hearty thanks be given to the official authorities of the University, and also to the College of Physicians and the College of Surgeons, for the complete, satisfactory, and agreeable manner in which they had put at their disposal the facilities which the congress had enjoyed. He recalled a visit which he made to Edinburgh thirty years ago, and, noting the great expansion which the city had undergone in the interval, said he had been told that that expansion was due not to expansion in trade, in commerce, or in things of material character, but had been due to the expansion of learning. He commended the University for having chosen as the symbol which crowned the dome of its old buildings the figure of a youth looking forward to the career in front of him. That symbol represented an idea. It represented the beginnings of what they themselves were deeply concerned in. They were men of varied periods of life, but he was perfectly sure there was not one who had come to that meeting—coming as they had done from all parts of Europe and America—in whom did not burn the thirst for learning. In that institution they found a flame which would still further illuminate and warm their hearts; and for all that those gentlemen had done in helping to carry forward successfully the meeting which now came to a close, he was certain that they would unite with him in rendering them most sincere and hearty thanks (applause). He begged to couple with his proposal a vote of thanks to the officers of the congress and to the members of the medical profession in the city (applause).

Sir William Muir, the principal of the University, acknowledged the vote of thanks on behalf of the University, expressing his sense of the great service which the ophthalmological congress rendered, not only to medical science, but in the relief of humanity. Dr. Young, Treasurer of the Royal College of physicians, and Dr. Littlejohn, President of the Royal College of Surgeons, returned thanks on behalf of their colleges, and expressed the pleasure they had experienced in entertaining the congress. The congress then rose.

[Since the above was in type the official transactions of the congress have been received, and it is found that several additional valuable papers are published therein, which were presented, but not read at the congress. These will be abstracted and published next month. A. A. H.]

PHYSIOLOGICAL TORSION VERSUS "INSUFFICIENCY OF THE OBLIQUES." A REPLY.

By F. B. EATON, M.D.
Prof. of Ophthalmology and Otology, Med. Dept. University of Oregon, Portland, Oregon.

In the October number of the OPHTHALMIC RECORD, the editor offered me space "to state the nature of the objectionable influence" I claim is exerted by his theories upon the therapeutic practice of those who accept them. He also expresses a doubt as to the correctness of my method of examination, since I can find no eyes which do not exhibit torsion (rotation on the visual axis), in convergence, while he finds but 25%. It is perhaps needless to state in general, that I believe his theories are harmful because I believe them to be erroneous, and therefore lead to erroneous practice, the results of which, while less immediately apparent than erroneous treatment of a corneal ulcer, are none the less real. Life is too short, and art too long, to justify loss of time and energy in following misleading paths. As to the claim that "we have cured hundreds of cases," I may be pardoned for calling attention to the fact that the history of religion and medicine is full of instances of astonishing successes attributed to certain beliefs and theories which time has nevertheless relegated to oblivion. I do not impugn Dr. Savage's cures, but I do impugn his assumptions unsupported by proof; his interpretation of the real conditions producing the asthenopia, as well as the real nature of the influences which removed these conditions, since the reports of his cases omit mention of many data necessary to a just conclusion as to etiology and treatment.

As the justness of my assertions depends upon my proving that the phenomena upon which are erected these theories concerning the oblique muscles, are physiological and in accordance with the teachings of physiologists of the highest authority, before describing my experiments and method of examination, I will ask the reader's attention to the following law governing the motions of the eyes, and its restatement by Helmholtz. It is generally misunderstood, and in consequence, the position of the vertical meridian of the retina, and hence that of the whole retina and eye-ball, is incorrectly stated in nearly every text-book which discusses the subject. This has given rise to confusion and misunderstandings, and has led the editors of the Record to think I do not mean what I say regarding the effect of raising or lowering the visual lines, upon the torsion of the eye, while they have attributed to the various ocular muscles, functions physically and anatomically incompatible, as well as contrary to Listing's law, which is thus formulated: "*When the visual line passes from the primary position to any other position, the angle of torsion of the eye in the second position is the same as if the eye had come to this second position by turning about a fixed axis perpendicular both to the first and second position of the visual line.*" Thus, in looking straight upward the visual line moves vertically in a vertical plane, and the only axis perpendicular to this course is the transverse horizontal axis of the eye. In looking straight to the right the visual line moves in horizontal plane, and the only axis of the eye perpendicular to this is the vertical.

To get a clear idea of the diagonal movements, it is *necessary* to take a hollow rubber ball, or an apple. Holding it in front of you, on a level with the eyes, thrust a probe or knitting-needle vertically through the side toward you; it will represent the vertical meridian of the retina when the eye is in the primary position. Now thrust a long knitting-needle (so as to pass through the centre), diagonally from your left downward to the right, through the ball or apple. On rotating the ball backward on this axis, the imaginary pupil, which is away from you, will look upward to the right, but the needle representing the vertical meridian will be inclined backward to the *left;* the torsion is to the left. Rotating it from you, the pupil looks downward to the left, the torsion is to the left, for the meridian is inclined forward to the left. If these experiments be repeated with an axis passing downward to the left, on rotating the ball backward, the pupil looks upward to the left, but the vertical meridian inclines to the *right*, while rotating it forward, the pupil looks downward to the right, and the vertical meridian inclines forward to the *right;* the torsion is to the right. In the four diagonal movements the pupil moves in a straight line, there is no torsion on the visual axis. If, however, the diagonal position upward to the left, for instance, be attained by first rotating the ball backward on its horizontal transverse axis, and then to the left on its now backwardly inclined vertical axis, torsion *on the visual axis* takes place to the right, and the vertical meridian is now in the same position as when rotation took place on the fixed diagonal axis downward from right to left, directly from the primary position. And so with the other diagonal positions, torsion on the visual axis occurs whenever, with the visual line elevated or depressed, one secondary position passes into another, not in a line with the primary position.

We can now understand the laws of ocular motion deduced by Helmholtz from Listing's law and given in his "Physiologie Optik." "When the plane of sight is directed upward, lateral displacements to the *right* make the eye turn to the *left*, and displacements to the *left* make it turn to the *right*.

"When the plane of sight is depressed, lateral displacements to the *right* are accompanied with torsion to the *right*, and those to the *left* with torsion to the *left*."

Now the error of the text-books, which has led to wrong diagnosis and practice, is due to confusing the *real* torsion of the eye with the *apparent* rotation of after-images of the vertical and horizontal meridians of the retina. Authors give the real torsion of the eye the same direction as the apparent inclination of after-images, whereas Helmholtz shows that it is exactly opposite to the latter. How the error is made, can be easily demonstrated with the ball and needle. If the ball be rotated from the primary position, backward on the needle thrust through it diagonally downward from left to right, the pupil will look up to the right (the ball being regarded from the rear). The needle representing the vertical meridian of the eye, will now be, with respect to a vertical line on a wall straight ahead, inclined to the left, this being the *real* torsion of the *eye*. But if the ball be held perfectly still in this position and the observer view it from the left side, the needle will be, with respect to a vertical line on the wall *now* back of it, inclined to the *right*, this being the *apparent* torsion of the eye and after-image, and so on, for all diagonal positions of the eye. The torsion I have termed *real*, is so, because the inclination of the vertical retinal meridian in reference to the vertical median plane of the head is termed by physiologists "the angle of torsion."

The bearing of these laws of Listing and Helmholtz upon the theory of "insufficiency of the obliques" is shown by the proof of the following propositions:

1. When the visual line is elevated, the tension of the internal rectus produces outward, and when depressed, an inward, torsion. The tension of the external rectus, in the same positions, produces torsion the opposite of this.

2. The influence of the oblique muscles in producing torsion,

is subordinate to, and relatively very slight compared with, that of the internal, external, and inferior recti.

3. In converging from the primary position to any point upward, or to any point more than forty-five degrees downward-Listing's law still prevails, the torsion being outward and in, ward respectively; but when converging downward from the primary position less than forty-five degrees, there is rotation outward on the visual axis in order to preserve corresponding points of the retina, and a surface of single vision, (horopter.) In passing from convergence above, to convergence forty-five degrees below the primary visual plane, the eyes, as in conjugate motion, rotate inward on their visual axes, and *vice versa*, but the vertical meridians are inclined outward from the median plane.

4, The use of prisms for the detection of torsion is misleading and unreliable, as they produce conditions and distortions which conceal or exaggerate the evidences of torsion.

1. The combined action of the muscles in producing rotation on the visual axis is thus illustrated by Hering: "This rotary motion does not require any peculiar innervation, this being already contained in the alteration in the course of the traction of the muscles in question. If the visual line be first raised by the combined action of the superior rectus and of the regulating inferior oblique, and if the internal rectus be innervated, this muscle no longer acts in a horizontal direction only. Its point of insertion is also elevated, and its belly forms a different angle with the visual line. Its tension must therefore cause a further elevation of the inner, that is a sinking of the outer, half of the horizontal retinal meridian, and with it an (outward E.) rotation around the visual line. * * * But what is true of the rectus internus with an elevated visual line, is also true of the externus when the visual line is lowered." We may add, that with a lowered visual line, for the reasons Hering has given, the tension of the internus rotates the eye inward on the

visual axis, this being the case when, with parallel visual lines, the eye looks downward and inward according to Helmholtz. But Dr. Price (See OPHTHALMIC RECORD November, pp. 184 and 198) imagines that the internal rectus can augment the outward rotating effect of the rectus inferior when the visual line is depressed, and accounts for this by a supposed displacement downward of the insertion of the internus, when it is clear that when the eye looks downward twenty-three degrees, especially in convergence, that the tendon of the internus makes the same angle with the visual line, that the rectus superior makes with it in the primary position, and that even if the tendon of the internus is inserted very low, as long as its traction is obliquely downward across the visual line, it must, like the rectus superior, produce torsion inward, being always, with depressed visual line, opposed to the rectus inferior as regards torsion.

2. But Drs. Savage and Price have attributed a torsional influence to the obliques they are far from possessing physiologically. For, since the superior and inferior recti make a traction angle of twenty-three degrees with the visual line in the primary position, and the obliques one of fifty-five degrees, therefore when the eye is turned inward sixteen degrees, the torsional and vertical tractions of each set of muscles is equal. When turned inward still further, the torsional effect of the recti predominates. Now, if with parallel visual lines, the eyes be turned straight downward, the superior obliques neutralize the outward torsional effect of the inferior recti; and if the eyes be turned from this position, twenty-three degrees to the left, the vertical meridians, according to the laws of motion, will be inclined forward to the left. Yet this torsion to the left is not produced by the obliques, but by the right internus and left externus, their traction being downward across the visual lines. In the right eye, the angle of traction of the inferior r. is now forty-six degrees with the visual axis, and that of the superior oblique only thirty-two degrees, yet the predominat-

ing outward torsional effect of the inferior r. is overcome by the internus. In the left eye, the inferior r. being coincident with the visual axis, has no torsional effect whatever, while that of the superior oblique is greatly increased, being at an angle of seventy-eight degrees with the visual line; yet the torsion is to the left in spite of the traction of the superior oblique, and can only be caused by the externus. Undoubtedly the obliques by their elastic tension and regulated innervation, aid in guiding these movements, and it must have occurred to others as well as myself, that the absence of diplopia or of any disturbance of the parallel movements of the eyes in distant vision in Dr. Savage's cases of "insufficiency of the obliques," is inconsistent with the existence of that condition in convergence, where he finds it, since it would lead to false positions of the retina during conjugate movements for distance.

3. For the determination of the nature and degree of torsion in convergence, I use a very simple bit of apparatus. A flat rod of wood, two feet long, one inch wide, and one quarter inch thick, carries two wooden collars; in one of these, a long hat-pin is inserted vertically, while the other carries a card or a small black-headed pin. One end of the rod is grooved to fit the bridge of the nose. When used, the grooved end is placed on the bridge of the nose slightly above the level of the interpupillary line when the eyes are in the primary position, the hat-pin being turned vertically downward, and behind it, the card with a dot on it in the median line and at a level with the pupils, or the small pin with its head at the same point. Sliding the hat-pin along the rod until it is thirteen inches from the eyes, and the card or short pin an inch behind it; the person examined looks at the latter, the rod being horizontal. The visual lines are now converged in the primary visual plane, and are perpendicular to the hat-pin, and mathematical perspective eliminated. While thus looking, crossed images of the hat-pin are seen, the left, which belongs to the right eye be-

ing inclined to the left and proving that that eye is rotated to the right on the visual axis (outward torsion), while outward torsion of the left eye is shown by the right image leaning to the right, the images meeting below, and diverging at their tops. If now the rod be elevated at its distal end, being careful to preserve the same relations of the head and eyes, the images will be seen to diverge at a greater angle; if it be lowered, the images are seen to become less and less divergent, until at a point forty-five degrees below the horizontal plane, as measured by a protractor, they become parallel to each other. Below forty-five degrees, they converge above, showing torsion inward. Referring to my third proposition, it will be seen that nearly all therein asserted is proven by this experiment, since the hat-pin, in every position is in the projection of the median plane of the head, and perpendicular to the line of sight. If in any position above given, it be inclined away from the observer eight degrees, the images become parallel showing that the outward torsion adapts the eye for single vision of all points of either a line or surface inclined eight degrees away from the observer, as demonstrated by Meissner and Le Conte. But in the primary position, this outward torsion also rotates the horizontal meridians of the retina, so that they do not coincide with a horizontal line, situated in a plane passing through the hat-pin. If this line or plane be so rotated on a vertical axis, that its right end is nearer the observer than the left, it will coincide with the horizontal meridian of the right eye, but by so much, it will coincide *less* with that of the left eye, But the convergence of each eye has the same effect as if the right and left ends of the line were brought nearer the observer, and the result is to make the horizontal line coincide with the horizontal meridian of each retina. If there were no rotation outward on the visual axis, convergence would render horizontal lines incoincident with the horizontal meridians, hence such rotation is a provision for preserving corresponding points of the retina and a surface of single vision in the immediate field of fixation, especially in the usual direction of fixation, that is, downward in convergence, when the interni, inferior recti, sphincter iridis and ciliary muscle, are in synergetic contraction, while the plane of vision is slightly inclined away from the individual above.

4. The use of prisms is misleading because:

(*a*) The Maddox prism of six degrees (used by Dr. Savage), produces so much verticle separation of the lines, that many persons fail to detect the lack of parallelism, but quickly detect it by the above described sliding pin test. This will partly account for Dr. Savage's failure to detect torsion in more than 25% of those examined. A weaker single prism (3 degrees) is preferable. (*b*) The prisms render manifest, exophoria in accomodation; convergence in the median line is thus lost, and by it torsion is produced. I have found this a serious obstacle to the demonstration of torsion when the exophoria is marked, this will undoubtedly account for another quota of Dr. Savage's failures.

(*c*) To appreciate the distortions of double prisms, draw a line six inches long with a dot at its middle, on a card, and hold it in the median line about fourteen inches away. Close the left eye, and place a six degree Maddox (double) prism before the right, so that the line of junction of the two prisms is across the pupil, and perpendicular to the visual line when the eye looks straight ahead. Now look at the dot. Two lines are seen converging toward the right, and on opening the left eye, the middle line, now seen converging to the right with the lowest line, indicates outward torsion, but generally appears parallel to the top line, thus indicating abscence of torsion. Hence, if the patient have right hyperphoria, the middle line will be nearer the top one and the patient will say there is parallelism. Viewed straight ahead, as they should be, the top and bottom lines are parallel, and the dip of the middle line, if detected, indicates outward torsion when compared with either. The same conditions, but reversed, are produced when the prism is over the left eye, and when it is rotated on its vertical axis to the right. (*d*) Torsion can often be demonstrated to the patient when he cannot at once detect it with the three degree Maddox prism, by moving it, at intervals, up and down before the eye, producing quick changes from base up to base down. In my own case, the dip is much greater with the prism base up before each eye, than with it base down. (*e*) I have never failed to demonstrate torsion by prisms, but the sliding pin test always quickly renders it apparent to all persons examined. In contrast to the prism test, binocular vison is in no way disturbed by this test; it is, for this reason, the more convincing as a proof of physiological torsion.

In conclusion: Dr. Price (OPHTHALMIC RECORD, Nov., 1894, page 198), after quoting my statement that outward torsion in convergence has been established as physiological for twenty years (Hering, Le Conte, Meissner), continues: "Does this argue anything against this theory of cyclophoria? Not at all." Dr. Price is to be congratulated upon arriving at this complacent conclusion in the face of the united experimental proofs of three such eminent authorities, of whom, Meissner and Le Conte, each ignorant of the researches of the other, reached the same result by different methods. However, I will quote from Dr. Maddox's article, "Latent Torsion of the Eyes" (*Ophthalmic Review*, June, 1894), previously quoted by Dr. Price (OPHTHALMIC RECORD, Aug. 1894): "* * I do not think torsional anomalies should ever be diagonosed without also making a *distant vision* test with a rotating prism, etc. * * It is safer, however I think, not to commit ourselves entirely to either 'insufficiency' or 'over-action' of the obliques, since other muscles besides the obliques are concerned in torsion. * * * As regards latent torsion, it is important to bear in mind that in *near* vissision, *apparent* insufficiency of the obliques is just as physiological as latent deficiency of convergence, and in distant vision slight deviations are not unphysiological."

I believe I have stated the main objectionable influences as Dr. Savage wished. It remains for me to repeat once more that he has not yet submitted adequate *clinical* evidence of the truth of his theories, since reports of cases, to form a just estimate of their value, should include such data as refraction under atropia (*not homatropine*), instilled for four or more days, the details of muscular tests, maxium accommodation, maxium convergence, range of accommodation and convergence, the relative ranges of the same, and the general health of the patient at the times of examination. This may seem too much to require, but a scientific paper should be exact, even to detail, and asthenopia has many causes. I have not here discussed the theory of compensatory action of the obliques in oblique astigmatism, because, even if such compensation occurred, the lateral recti, as I have shown in proposition 3, would be the ones principally involved.

Finally, I invite Dr. Savage to meet the physiological *facts* and experimental proofs I have given in my former paper (which he has not yet done), as well as those contained in the present one.

THE IMPORTANCE OF MAINTAINING EQUAL ROTATIONS OF THE EYES AFTER OPERATIONS ON THE OCULAR MUSCLES.*

By GEORGE T. STEVENS, New York.

A most unfortunate path to error in that field of ophthalmology which deals with the correlative positions of the two eyes lies in the misleading expression "the squinting eye."

In all the literature of strabismus in text-books from the time of Strohmeyer and Dieffenbach until now, attention has been especially directed to the "squinting eye" and the treatment which must be directed to it.

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*Read in Section of Ophthalmology of the British Medical Association at Bristol, 1894.

As a rule, in concomitant strabismus, a rule with few exceptions (not considering the cases which are strictly of a pathological character), there is no squinting eye, if by that expression a deviation confined either wholly or largely to one eye is intended. Strabismus concomitans is a mutual relation between the eyes, and if there is an actual deviation of one eye inward or outward, that deviation is almost universally shared by the other eye. If an ordinary case of such strabismus is examined with care, several conspicuous facts must be brought to our attention.

1st. The familiar "secondary" squint when the habitually deviating eye is forced to fix the object.

2nd. The much less familiar fact that if each eye is caused to rotate to its extreme ability toward the nasal or toward the temporal side, the rotations are in many cases strictly equal, and in cases where slightly unequal rotation is found, it is not usually on account of the comparative tensions of the lateral recti, but from causes to which reference will be made as we proceed.

Suppose the examination to be in an ordinary case of converging strabismus: If we cause the patient to roll first each eye as far toward the nose as it is possible, we can observe that in the case of each eye, the rotation is excessive and that the excess in one case equals that in the other; then, if the eyes are alternately directed as far as possible to the temporal side, there is usually little difference and the restriction, if one exist, may be not in the rotation of the squinting eye, but of the eye habitually fixed. If then there occurs a secondary squint when the usually deviating eye is covered, and if the rotations are, in case of each eye, excessive and equal in the direction of the deviation, why should one eye habitually remain as the eye of fixation while the other habitually deviates?

Let us suppose a perfectly uncomplicated case of converging strabismus, one in which the nasal rotations are each excessive and equal, and in which the tensions of the vertically acting muscles are also equal; in such a case, either alternating strabismus will occur, or if one eye is selected for habitual fixation, it will be that which is more advantageously constituted for accommodation at the point of fixation. In certain cases in which one eye is emmetropic or nearly so, while the other is moderately myopic, the fixing eye for distance is the emmetropic one, while that for near points is the myopic eye. Usually the reason for habitual fixation of one eye is found in the fact that the patient selects the eye which is best suited to clear vision. If there is a difference in the refractive states, the eye most nearly approaching emmetropia, is selected as the distant fixation eye. The fact of such a selection does not indicate a better or a different state of muscular tensions on the part of the selected eye. Nor is the eye which is not selected for fixation on that account, more a squinting eye than the one usually employed for fixation.

Lateral strabismus, as I have at various times indicated, is not infrequently the result of a difference in the tensions of the vertically acting muscles. This difference in the relative tension vertically is a most annoying and perplexing one to the patient. One of the strongest of the muscular instincts is to see vertical objects vertical, and horizontal objects horizontal. When the power to see objects thus is absent, the power of maintaining the equilibrium of the individual is compromised. One may see double in the horizontal direction with relative comfort compared with the confusion from diplopia in the vertical or oblique direction. In a tendency toward vertical diplopia, one of two means will be attempted for relief. The person subject to the defect will perhaps acquire the faculty of mental suppression of one image; unless the deviation in this vertical direction is considerable, this is difficult to accomplish.

If this effort fails, the patient may, by placing much stress upon the vertically acting muscles, bring the images to a level; at the same time, by virtue of the adducting action of these muscles, he may force a deviation inward. This inward deviation may in many cases be encouraged by the fact that in conjunction with the unequal vertical tension, there is also a moderate excess of tension of the interni over the externi. When the habit of such a lateral deviation has become once established, the force directed to bringing the images to the horizontal plane may be in some measure relaxed, for with a squint inwards or outwards, the urgency for maintaining horizontal images is modified. When the images are far removed from each other by such a squint the ability to suppress one of them increases.

Another, and a very frequent cause of squint is found in an anomalous tension of corresponding vertically acting muscles, acting inordinately upwards or downwards either equally or unequally. In such cases the excess of tension of these vertically acting muscles induces a converging squint or, if the excess is very unequal, a diverging one.

To these two classes, in which converging squint results, first, from the efforts of the patient to free himself from the annoyance of vertical or oblique diplopia, and second, from excess of tension of all the vertically acting muscles belong those cases in which convex glasses afford temporary relief. In such cases, if the tensions of the counteracting rectus superior and rectus inferior of one eye should be materially greater than of the other, the lateral rotation of that eye might be somewhat restricted outwardly or increased nasalwards and thus lead to the supposition that the external rectus is less, or the internal rectus more, potent than the corresponding muscle of the other eye.

In this unequal vertical tension also is found an explanation of some marked exceptions to the rule to which I have already referred, that the eye most nearly emmetropic is usually the fixing eye.

In some cases of decided hypertropia (deviation of one visual line above the other), the upward turning eye is the best eye; yet on account of the difficulty of holding this eye in the proper line for fixation, the astigmatic or otherwise ametropic eye will be selected as the most advantageous eye for fixation, and the well constructed eye will squint.

It was not the original design of this paper to discuss the causes of strabismus, but I have ventured upon this introduction somewhat at length, in order to base the considerations of treatment not upon apparent and superficial facts, but upon the fundamental principles with which we have to deal.

However important may be the removal of the deformity of strabismus from the cosmetic point of view, the supreme motive for strabismus corrections should be the establishing of binocular vision. If one believes that the ordinary perfunctory division of an internal rectus of the squinting eye in converging strabismus often establishes such vision, he will be undeceived if he make many careful examinations in cases which have been subjected to such surgical treatment. Continuous binocular vision can only exist where there is approximate equality of tension of corresponding muscles of the two eyes, and easy binocular vision is only possible when the nervous impulse for the direction of one eye is exactly similar to that for the other. Corresponding action of two interni cannot be maintained, and in some cases cannot be even temporarily induced in a case in which the rotating power of one internus has been reduced, while the other remains intact and excessive.

Here lies the secret of von Graefe's cases of "antipathy to single vision," cases which are infinitely more common than is generally supposed. When one internus had been cut, and another retained its excessive tension, and especially when the image of one eye lay normally in a higher plane than the other, or where there was great excess of action of all the vertically drawing muscles, there could be no permanent union of images. Few cases operated by the usual methods have any practical binocular vision. By careful attention, not to the gross and most conspicuous phenomenon of strabismus, the lateral deviation, but to the essential and important relations of the tensions in vertical as well as horizontal direction, the failure to obtain practical binocular vision which is the extremely common result of strabismus operations may be practically eliminated. An operation properly performed on a superior rectus will often completely relieve a moderate converging or diverging strabismus by removing the necessity for the squint, as will also in a good proportion of cases a relaxation of the two corresponding upper or lower recti.

Some years ago, I expressed my conviction that the condition of antipathy to single vision, as described by von Graefe, and by subsequent authors, depends not upon lesions of the brain, or upon faulty projection of the images from the retina, but upon unequal tensions of corresponding muscles under the influence of corresponding nerve impulses directed to them. Abundant experience and research in this field has since then fully confirmed this view. It has also led me to see that even in cases in which extremely moderate modification of the tension of a single lateral rectus has been made with the view of relieving conditions of heterophoria, that is, of conditions of less grade than strabismus, a tension of one muscle unequal to that of the corresponding muscle, results, after the first relief from the primary defect, in much perplexity of vision and often in much nervous distress.

If these principles are conceded, we should abandon the idea of correcting any lateral squint by an operation on a single muscle. Even if the rotation is to be affected only to the extent of a few degrees, the equilibrium should be maintained. But if the correction of slight strabismus, or even of esophoria, or of exophoria by relaxation of a single muscle is to be avoided, how much more must we reject the idea of doing a tenotomy on an internal rectus and an advancement of the external rectus of the same eye, as has been proposed and practiced, while the so-called but mis-called non-squinting eye remains with its original tensions.

The precept which I would earnestly impress, is one which I have already on former occasions urged, viz., that, "*Every modification of a lateral muscle by relaxation or by shortening which can in any degree affect the rotation of one eye should in every instance be accompanied by an exactly equivalent modification of the corresponding muscle of the other eye.*"*

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*Stevens: Archives of Ophthalmology, 1889, p. 407.

LATENT TORSION OF THE EYES.

By ERNEST E. MADDOX, M.D., Edinburgh, Scotland.

[This paper by Dr. Maddox has been quoted by writers in the RECORD several times. To show the reader exactly what he did say, the paper is republished from the June (1894) issue of the *Ophthalmic Review*.—EDITOR.]

Manifest torsion of the eye in cases of ocular paralysis has been well studied, but the physiology of torsion, apart from paralysis, is not yet fully understood. Le Conte, in his admirable book on "Sight" (1881), relates how he can prove outward torsion of his two eyes during *convergence* of the visual axis, when the desire for single vision is suspended. He produced the requisite dissociation by his rare power of creating, at will, a strong convergent strabismus, and quotes Meissner as having previously demonstrated the same outward torsion by a different and more doubtful method in 1858. Le Conte found great difficulty in applying his test to others, because so few possessed his power of dissociating their eyes so as to produce a convergent squint. He says: "To generalise this as a law of ocular motion I have found extremely difficulty because there are so few persons who are able to verify the results." There is a plan, however, which I adopted when I first read his book, which enabled me to confirm his results on myself, and which anyone can easily manage. With a prism of 6° d., edge out, before the right eye, look at a vertical line drawn on a piece of paper, and held at the near point of vision. Then suddenly rotate the prism to the vertical. The two images of the line are seen to cross each other at a small angle as they meet, before the eyes have time to fuse them. By rapidly rotating the prism, sufficient time for fusion is not given, and the angle can be easily observed. The experiment may be varied by holding the line horizontal when a weaker prism held vertical to start with will suffice. A variation in the test is to draw a straight dotted line, and also a continuous red line parallel with it. These should be held horizontally with a vertical prism before the right eye of such a strength as to bring the false image of the dotted line over the true image of the red. There is so little tendency to fuse these two that the slightest angle between them can be leisurely observed. By drawing the two lines at various inclinations to each other, instead of being parallel, the angle can be accurately measured. Dr. Savage's plan is to use my double prism before one eye of the patient, while a horizontal line at eighteen inches is made the object of fixation, and this is really a very good test.

But I do not think torsional anomalies should ever be diagnosed without also making a *distant vision* test. With a rotating prism, any straight line on a uniform ground, at 6m. distance, will serve the same purpose as the near vision test, or the patient can be made to look at a flame, 6m. distant, through a glass rod, six inches long, and $\frac{3}{4}$ in. thick, held horizontally before both eyes. One streak of light is then visible, till resolved into two by placing a 6° d. prism, edge out, before the right eye. Rapid rotation of the prism to the vertical and back again enables one to see if the two streaks of light are parallel or at an angle. In my own case, their upper ends are slightly inclined to each other, showing slight lateral torsion in whatever position the head is held. Le Conte showed that, in near vision, the outward rotation of the eyes increases on looking upwards and decreases on looking downwards, and this made him attribute the phenomenon to over-action of the inferior obliques. It is safer, however, I think, not to commit ourselves entirely to either "insufficiency" or "over-action" of the obliques; since other muscles besides the obliques are concerned in torsion. Moreover, I prefer to think of the faculty of torsion, when exerted in the interests of fusion, as a definite coordinative faculty just as convergence is, so that it seems to me better to speak of latent torsion, rather than of "insufficiency of the obliques."

Dr. Savage has shown that a certain amount of corrective torsion, or, to substitute his own words, of "harmonious symmetrical action of the obliques" is necessary when oblique astigmatism exists in both eyes, since the retinal images of vertical objects are not themselves vertical, and that correcting cylinders which make these images vertical alter the torsional requirements. These facts may well have the practical bearing he claims for them. Of latent torsional anomalies sufficiently great to be called pathological, I have no experience, apart from definite paralysis of individual muscles, and therefore confine my remarks to the physiology of the subject. The torsion of the eye, as we all know, is of much value in the differential diagnosis between paralysis of the superior oblique and inferior rectus, as well as in the attempt to discover whether the fourth nerve is involved in a case of paralysis of the third. How to measure this torsion by the rod-test I have already shown in a previous paper. As regards latent torsion, it is important to bear in mind that in *near* vision, *apparent* insufficiency of the obliques is just as physiological as latent deficiency of convergence, and in distant vision slight deviations are not unphysiological. Only extreme cases should, I think, be regarded as likely to cause asthenopia, but as they are not personally familiar to me, I cannot express myself strongly on the point.—*Ophthalmic Review.*

THE IMPORTANCE OF ACTIVE TREATMENT OF THE NASO-PHARYNX IN THE TREATMENT OF OBSTRUCTIVE DISEASE OF THE LACHRYMAL PASSAGES.

By C. A. VEASEY, M.D.

Chief Clinical Assistant to the Ophthalmological Department of the Jefferson Medical College Hospital; Instructor in operative ophthalmology in the Philadelphia Polyclinic; Consulting Ophthalmic Surgeon to the Philadelphia Lying-In Charity Hospital and Nurse Training School.

That obstructive disease of the lachrymal passages are frequently caused by some intra-nasal lesion is generally conceded by the majority of ophthalmic surgeons. That, in a great many cases in which the intra-nasal affection, if there be such, is not the cause of the disease of the lachrymal passages, it is a potent factor in keeping up the inflammation in them, and in preventing the successful treatment, if such be directed against the lachrymal passages alone, is also generally understood. So it would seem almost superfluous for the author to add to the already large accumulation of literature on this subject were it not for the fact that he has in the past few years had the opportunity of treating a number of such cases of obstructive lachrymal disease where there were ascociated intranasal lesions, and in which, before coming under his observation, unsuccessful attempts had been made to cure the former without any attention to the latter, and in which as soon as the proper intra-nasal treatment was instituted the lachrymal affection was rapidly cured.

It is not claimed that all cases of obstructive disease of the lachrymal ducts are due to some trouble within the nose, nor that all cases can be rapidly cured; for, as is well-known, they are among the most difficult, and sometimes the most tedious, cases with which the ophthalmic surgeon has to deal. But it is claimed that in a great many cases the cause is primarily within the nose, and that the treatment of the ducts alone in these cases will prove ineffectual; and, that when the origin of the trouble is not within the nose, nevertheless there being some co-existing intra-nasal disease, the most prompt and permanent eradication of the disease of the lachrymal passages that can be obtained, can be effected by directing treatment against the intra-nasal condition as well as against the disease of the passages themselves.

In the treatment of any disease of the lachrymal duct it is of course necessary, in addition to the treatment of the duct itself, to make a thorough examination of the nares and naso-pharynx and if any disease be found to direct the treatment against it as well as against the former lesion. In many cases in which there is only a slight inflammation of the mucous membrane, having extended, perhaps, into the lower portion of the nasal duct, all that will be required is the spraying of the parts once or twice daily with a mild alkaline and astringent solution. The following will be found very useful, and can be employed by the patient at home with the use of a bulb-atomizer:

℞
Acidi Borici,
Sodii Boratis,
Sodii Bicarbonat, āā grs. xii.
Glycerinæ ʒ ii.
Aquæ Destillatæ q. s. ℥ iii.
Ɱ. Use in Atomizer.

Should the mucous membrane be more severely inflamed and swollen, the treatment must be somewhat more elaborate. After cleaning the nares with the alkaline solution the author employs a spray of antipyrin (grs. xx—℥ i), preceding it with a spray of cocaine (3% solution) if necessary, which causes an immediate contraction of the swollen membrane, lasting for a variable period, and then applies with a bit of absorbent cotton wrapped on a probe, or applicator, either the compound tincture of benzoin or the following, which is formula of Sajous:

℞

Iodinii, ʒ ss.
Acidi Tannici, ℥ ss.
Aquæ, O ss.
Mix, filter and evaporate to ℥ ii, and add
Glycerinæ, ℥ iv.
Acidi Carbol. liq. ♏ ii.

Immediately afterward a spray of some bland oil, like albolene, to which has been added menthol (grs. x-xx to ℥ i), will complete the nasal treatment, and give a most refreshing sensation to the patient.

Should there be any bony spurs, or polypi, or chronic hypertrophies, or any such severe lesion, and to these the appended list of cases more particularly refers, the patient should be referred to the rhinologist for the proper surgical interference. By attention to these intra-nasal affections it is frequently possible to cure a case of obstructive lachrymal disease in half the time it would take were they not attended to, and relapses are not nearly so frequent.

The following are a few of the cases that will serve to illustrate the points above referred to:

CASE 1.—*Purulent dacryo-cystitis; hypertrophy of right lower turbinated bone.*—F. E., aged twenty-eight, consulted me, for lachrymal obstruction saying that for the past eight years he had been able at times to express some purulent material from the right lower canaliculus, and that the tears flowed over the right cheek almost constantly. Four years ago his canaliculus was opened and probes passed, but the obstruction, though being better for the time, always returned. His nares were examined, and the left side found to be normal; but the right lower turbinated bone was considerably enlarged causing some pressure on the swollen mucous membrane near the orifice of the duct. The hypertrophy was removed, the inflamed mucous membrane treated with soothing applications, probes were passed into the duct, and the latter washed out, daily at first, then less frequently, with antiseptic and astringent solutions, and in a few weeks the trouble entirely disappeared. Although one and a half years have elapsed, the patient reports that he has never had any return of the disease.

Case II.—*Purulent dacryo-cystitis; hypertrophy of inferior turbinated bone on both sides with a spur of the septum on the right.*—A. S., age forty-four, married, presented herself for the treatment of obstructive inflammation of both lachrymal ducts characterized by a profuse discharge of pus from both upper and lower punctæ lachrymæ of each eye, with almost constant epiphora, these symptoms having been present for several years. Both lower canaliculi had been opened about two years before and the ducts washed, but the patient claimed that no fluids had ever passed into the nose. An attempt was made to pass probes, but it was impossible to get one through the duct on the right side, though with considerable difficulty one was introduced into the left duct, and fluid passed through into the nose.

An examination of the nares revealed a very much enlarged inferior turbinate on each side, and in addition a large spur of the septum on the right pressing on the hypertrophied turbinate. The hypertrophies and the spur were removed, the nares treated, and in a short time a probe was passed on the right side. The ducts were then treated in the usual manner with antiseptic and astringent washes and soon the purulent discharge and epiphora entirely ceased. The patient informed me by letter a few days since that there had been no relapse.

Case III.—*Catarrhal dacryo-cystitis; hypertrophic rhinitis with deviation of the septum to the left.*—I. W., age forty-six, married woman, consulted me for a small abcess of lower lid of right eye. During the examination it was seen that the left lower canaliculus had been opened, and that considerable mucoid discharge could still be expressed by pressure over the left lachrymal sac. Patient stated she had been treated three different times but had obtained only temporary relief. The intra-nasal examination showed a marked hypertrophic rhinitis on both sides, probably made much worse by a deviation of the septum towards the left. This condition was remedied by operation, and afterwards the duct was treated, the result being that the patient was cured of a chronic affection and has had no relapse seven months later.

Case IV.—*Epiphora; polypus; hypertrophy of right inferior turbinate.*—C. H., aged thirty-eight, male, came to the eye dispensary of the Jefferson Medical College Hospital, service of Dr. de Schweinitz, for the treatment of an extensive swelling of the lower lid and cheek of the right side of two days duration. Nothing could be expressed from the canaliculus but the parts were exceedingly painful, and there was marked epiphora which the patient said had existed for several months. Vision and accommodation were good. He was given Basham's mixture, told to employ hot compresses at frequent intervals, and sent to the throat department for the nasal examination. There was found a polypus with hypertrophy of the lower turbinate, both on the right side. The polypus was removed at once. In three days the inflammatory condition of the lid and face had subsided, and canaliculus was opened, probes passed and the duct washed out, the fluids readily passing into the nose. The mucous membrane of the duct was somewhat swollen but there were no strictures. In about ten days, however, the patient had a relapse, his lid and face being in as bad a condition as before. At this time the hypertrophy of the turbinate was removed and the duct treated as before. The patient is still being seen once a month but there has been no return of the swelling, and the epiphora has disappeared.

CASE V.—*Lachrymal abcess; syphilitic ulceration of septum; marks of former ulceration in pharynx.*—M. S., aged thirty-two, unmarried male, was sent to me for treatment of lachrymal abcess on right side of face. There were numerous scars on both sides over the region of the lachrymal sac, and the patient said he had had abcesses of the same kind, four times within the two years previous. Admitted contracting syphilis four years ago. The abcess was opened over the sac and treated with hot antiseptic compresses, and antiseptic irrigations, and he was given internally Basham's mixture. As soon as the acute inflammation had subsided the canaliculi were opened on both sides, there being some discharge from the left, with epiphora, probes were passed, and the nasal examination made when it was found that there was a large sharp cut ulcer which had eaten through the septum. There was chronic hypertropic rhinitis and the pharynx was also chronically inflamed, there being numerous scars indicating old ulcerations. He was placed on antisyphilitic treatment, the nasal ducts and the nares were properly treated, and there has been no return of the disease except once, at which time he had neglected the internal medication for some weeks before. Upon resuming the remedies the relapse disappeared.

Many other cases could be added to the above, but these seem sufficient to emphasize the following points:

1. In beginning the treatment of any case of obstructive disease of the lachrymal passages, in addition to the passing of probes and the cleansing of the duct with solutions, it is essential that a thorough examination of the nares be made.

2. If a simple inflammation of the nares be found it should be treated by means of appropriate simple methods at the same time that the lachrymal duct is being treated from above.

3. If any more serious complications be observed such as require operative interference, this interference should be undertaken at once, as the disease of the lachrymal duct will get well much more quickly if this be done.

4. It should not be forgotten that many cases, to a very great extent, are due to constitutional disturbance, and that in such cases the proper internal remedies must be administered during the local treatment of the obstructive disease.

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THE FUNCTIONS OF THE OBLIQUE MUSCLES. ESPECIALLY AS THEY ARE RELATED TO OBLIQUE ASTIGMATISM.*

By G. C. SAVAGE, M.D.
Professor of Ophthalmology in the Medical Department of Vanderbilt University
Nashville, Tenn., U. S. A.

The common purpose of all the extrinsic ocular muscles is the production of binocular single vision, in obedience to the law of corresponding retinal points. The recti muscles are designed to control the visual axes, while the obliques are concerned with the corneo-retinal meridians. In model eyes a plane may be constructed so as to cut the macula and the nodal point of each eye and that point of the object to be fixed. The superior and inferior recti must keep the two visual axes in this plane, while the external and internal recti must direct them so that they may intersect at the point to be fixed. Since, in all eyes free from oblique astigmatism, all other visual lines bear a definite relationship to the visual axis, they may be ignored in any study of the ocular muscles. If the recti muscles, in accomplishing the purpose of their existence, effected no other change of the eyes, there would be no need for oblique muscles in eyes not having oblique astigmatism. The three axes of rotation are at right angles to one another, their point of intersection the nodal point—the center of retinal curvature. The lateral recti muscles if properly attached to the globe, will rotate it only on the perpendicular axis; the superior and inferior recti, could not, if unopposed, effect the rotation of the eye on its transverse diameter, and hence would cause a form of double vision in spite of the fact that they would keep the visual axes in the normal plane. In order to insure binocular single vision other muscles are needed besides those that govern the visual axes, and these muscles are the obliques.

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If there were no such condition as astigmatism, or if the principal meridians in astigmatic eyes were always vertical and horizontal, there would be but one function for the oblique muscles, and that function would be the keeping of the naturally vertical meridians of the corneas parallel, and their study would be greatly simplified. The prime object of this paper, however, is to show that the obliques have another and more complicated function to perform in many cases. Taking causes into consideration we may say that the one function of the obliques is simple while the other is complicated.

THE SIMPLE FUNCTION OF THE OBLIQUES

is keeping the naturally vertical meridians parallel. The need for this exists in all eyes, whatever may be the state of refraction other than oblique astigmatism. Even in oblique astigmatism equal in amount in the two eyes and the meridians of greatest curvature parallel, only the simple function is performed by the obliques. The necessity for this function of the obliques resides mainly in the action of

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which is faulty in all cases, because of the course of these muscles and their attachment to the globe. When the inferior recti are called upon to direct the visual axes below the horizontal plane of the two eyes, they, at the same time, tend both to converge these axes and to rotate the eyes so that the naturally vertical meridians would diverge above. To counteract this latter tendency the superior obliques are thrown into a state of activity and the parallelism of the vertical meridians is maintained. When the visual lines are to be directed above the horizontal plane, by contraction of the superior recti, these muscles, besides tending to converge the axes, also tend to converge the vertical meridians above, to counteract which the inferior obliques are brought into a state of activity and thus parallelism is preserved.

If the tendons of the internal and external recti attach themselves, in greater part, below the horizontal plane of the eye, these muscles in adducting and abducting the eyes would tend to revolve them so that the vertical meridians of the corneas would diverge above. This tendency would be counteracted by the superior obliques. Should the lateral muscles be attached to the globe, mainly above the horizontal plane, adduction and abduction would be associated with a tendency to converge the vertical meridians above, which would be prevented by the action of the inferior obliques. It is probable that the one or the other error of attachment of the internal and external recti is not uncommon.

Thus it is seen that, with every contraction of the inferior recti, there must be an associated corrective contraction of the superior obliques; and, with every action of the superior recti, there is an accompanying and correcting action of the inferior obliques. Since we look down far more than we look up, the superior oblique muscles, in the same proportion, are made to do more work than the inferior obliques. Thus it is readily seen that the recti and oblique muscles, while opposing one another in action to a certain extent, work together in effecting binocular single vision, by keeping the two retinæ so related that the images fall on corresponding parts.

Plate I represents a pair of eyes that are non-astigmatic, or if astigmatism exists, the principal meridians are vertical and horizontal. These eyes are represented as looking at a rectangle.

The line *ep* across the right eye is the horizontal meridian and the line *gh* is the vertical meridian, while their points of inter-

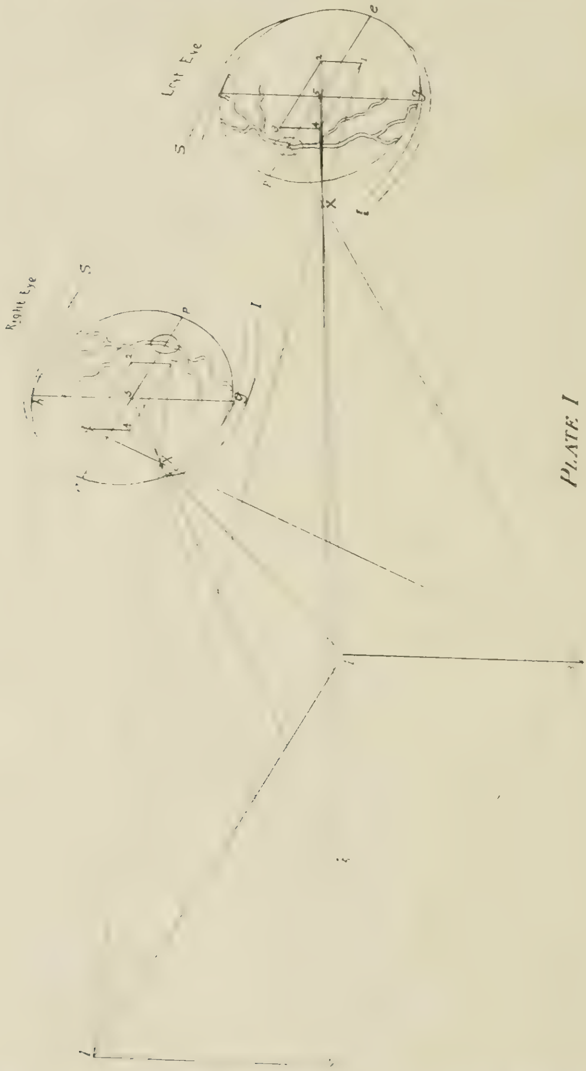

PLATE I

section (5) is the macula. Similarly the line *ep* in the left eye represents the horizontal meridian and *gh* the vertical meridian, their point of intersection (5) being the macula. The vertical meridian of the right and that of the left are parallel. Point 5 in the rectangle is the point of fixation. The line 5-5 from the macula of the right eye is the visual axis of that eye, and likewise the line 5-5 is the visual axis of the left eye. These intersect at point 5 of the rectangle.

According to the well-known law of refraction by curved surfaces, such as are now under consideration (non-astigmatic eyes), the rectangular object will throw a rectangular image on each retina, the size of which will bear a definite proportion to the size of the object. The nodal point of the right eye is *x*, through which all lines of direction from this eye must pass. The lower-inner corner of the image is thus connected with the upper right hand corner of the object by the line 1-1. In the same way the upper-inner corner of the image is connected with the lower right hand corner of the object by the visual line 2-2; and so on for the other corners of image and object. In like manner the corners of the rectangular image in the left eye may be connected with corresponding corners of the object by lines passing through the nodal point *x* of that eye. If the left eye should be excluded, the right eye would see the rectangle 1-2-3-4; if the right eye should be screened, the left would *see* the same rectangular figure. Both eyes together, in obedience to both the law of corresponding retinal points and the law of projection, would see the one common rectangle 1-2-3 4. The superior and inferior recti, in these eyes, have kept the visual axes in the normal plane; the external and internal recti have regulated their tension so that they have converged these axes to the point 5; and the superior and inferior obliques have kept the naturally vertical meridians parallel.

It has already been stated that the obliques have to perform only the simple function in oblique astigmatism when the meridians of greatest curvature are parallel and the degree of astigmatism is the same in the two eyes, and yet it would not be possible for such eyes to see the rectangle, held in position shown in Plate I, as a rectangle. Let the meridians of greatest curvature be at 45° in the right and also at 45° in the left eye. As a result of the refraction of the astigmatic cornea of the right eye, the rectangular figure would throw a parallelogram image on the retina, the image inclining down and out. A parallelogram image would be thrown on the left retina also, and it would incline down and in. Looked at with either eye alone, the rectangle would be seen as a parallelogram inclined down and to the right. Looked at with both eyes it would be a parallelogram of the same shape and inclination as seen by each eye separately. The extrinsic muscles of these eyes have performed the same function as the muscles of the eyes shown in plate I, and with the same result, viz.: binocular single vision. The law of corresponding retinal points and the law of projection having full sway in both pairs of eyes, the one pair sees the figure as it is—a rectangle, while the other pair sees the same figure, when held in the same position, as a parallelogram leaning down and to the right. With the visual axes properly directed by the recti, and the vertical meridians kept parallel by the obliques, the two eyes are kept so related that the two images of the object looked at fall on harmonizing parts of the two retinæ and the object is necessarily seen as one, and of same shape as when seen with each eye separately.

In any state of refraction the relationship between corresponding points of the two retinæ is unalterable. It is well-known, that, taken as a whole, the nasal half of one retina, harmonizes with the temporal half of the other; and that all points of either retina bear a fixed—an unalterable—relationship to the macula and to the vertical and horizontal meridians. A retinal point in the nasal half of the right retina bearing a definite relationship to the macula and the vertical and horizontal meridians, must harmonize with a point in the temporal half of the left retina similarly located; and it can harmonize with no other retinal point, under any conditions.

THE COMPLICATED FUNCTION OF THE OBLIQUES

is necessary in oblique astigmatism, when the meridians of greatest curvature diverge or converge above. This is necessary that they may bring harmonizing parts of the two retinæ under dissimilar images and thus insure binocular single vision.

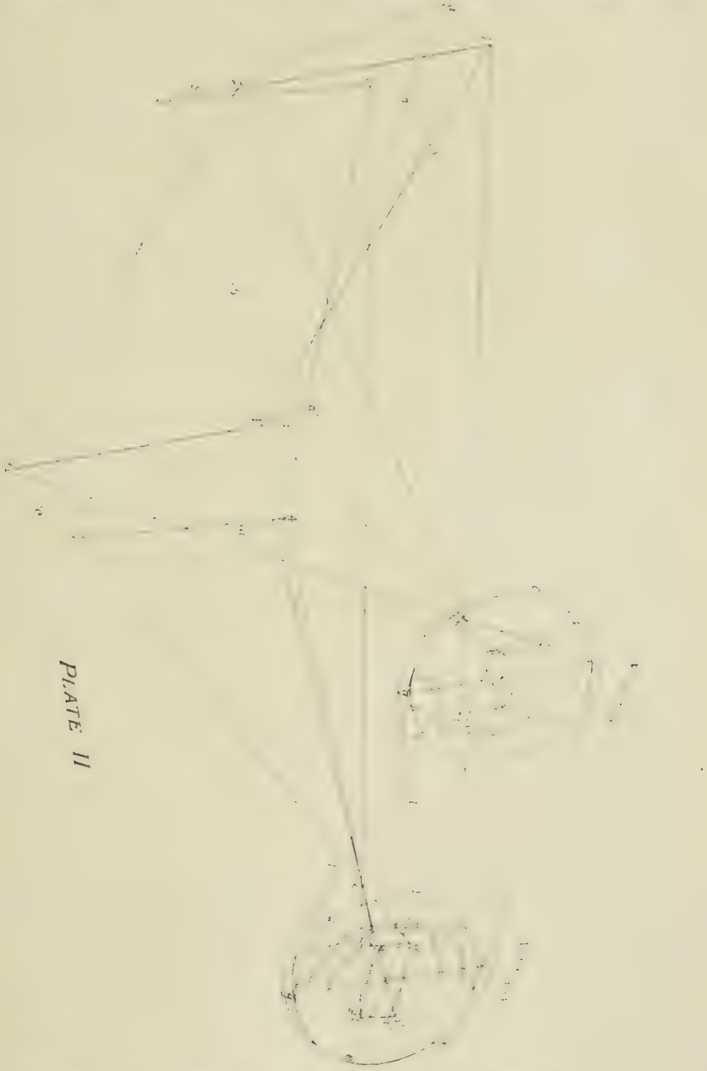

PLATE II

But, as will be shown, the object, though seen as one, will be distorted.

Plate II may be taken for study. Both eyes have oblique astigmatism of the same kind and quantity. In the right eye the meridian of greatest curvature is at 135° and in the left at 45°. As set forth in a former paper, the refraction in oblique astigmatism is such as to make vertical and horizontal lines incline towards the meridian of greatest curvature. If the rectangular figure, represented in Plate I, be held in the same position before the eyes represented in Plate II, it could not be seen with either eye alone or with both together, as a rectangle. The rectangle shown in Plate I, when held before the right eye in Plate II, instead of throwing a rectangular, would throw a parallelogram, image on the retina. The same rectangle would also throw a parallelogram image on the left retina. The state of refraction of the right eye would make the distorted image lean down and toward the left, while the distorted image in the left eye would lean down and towards the right side. Cutting off the view of the left eye the law of direction would have full sway, while the law of corresponding points would be suspended. Since in one eye alone the law of direction is unalterable, all lines of direction must cross in the center of retinal curvature, and the right eye, with the parallelogram image leaning down and to the left, must see the figure casting the image, not as a rectangle but as a parallelogram leaning down and to the left. Screening the right eye while the left looks on the rectangle, it is seen, not as a rectangle, but as a parallelogram leaning down and to the right, the law of direction determining the shape of the figure seen by the left eye just as it fixed the shape of the figure seen by the right eye. Fig. 1-2-3-4 is what is seen with the right eye alone; fig. 1-′2-′3′-4′ is what is seen by the left eye alone. The moment these two eyes are allowed to look at the rectangular figure, the law of corresponding retinal points is brought into conflict with the law of direction and the latter is modified by the former. There is no necessity for changing the visual axes when looking at the rectangle with these two eyes; but unless some change is effected in some way, each eye would see its own parallelogram leaning down and towards the opposite side. Instantly a change does take place in both eyes so that the two together see, not a rectangle nor a parallelogram, but a trapezoid with the longer side above. A clear understanding of what this change is and how it is effected may be had by a further study of Plate II. In the right eye is shown a dotted parallelogram *a-b c-d*, of precisely the same form as the parallelogram image 1-2-3-4, but in the former the upper and lower lines are parallel with the horizontal meridian. In the left eye also is shown a dotted parallelogram *a′-b′-c′-d′* of same form as the parallelogram 1′-2′-3′-4′, with its upper and lower lines parallel with the horizontal meridian of this eye. The line *c-b* in right eye bears throughout the same relationship to the macula, the horizontal and vertical meridians of this eye, that the line *c′-b′* does to the same parts of the left eye and therefore correspond. The greater part of line *d-a* in the right eye also corresponds with the greater part of the line *d′-a′* in the left eye, the parts of these lines not corresponding being their extremities. But the line *c-d* in right eye nowhere corresponds with the line *c′-d′* in the left except at the points of beginning above; and the same is true of lines *b-a* and *b′-a′*, in their respective eyes. If the dotted parallelograms could be made to coincide with the parallelogram images, the result would be that the two eyes together would see the figure *a-b-c-d′*, a trapezoid with the longer side above. How this is effected is shown in Plate III, where each eye has been revolved on its visual axis by the superior oblique muscle so that the horizontal meridian is made parallel with the upper and lower borders of the parallelogram image, and thus as far as possible corresponding parts of the two retinæ are brought under the two dissimilar images, and the figure seen binocularly is *a-b-c-d′*. The part of this trapezoid seen in common by the two eyes is *a′-b-c-d*, the part seen by the right alone is *a-b-a′*, and that seen by the left eye alone is *d-c-d′*. As will be seen the law of corresponding points has so modified the law of projection that the visual lines no longer have a common crossing

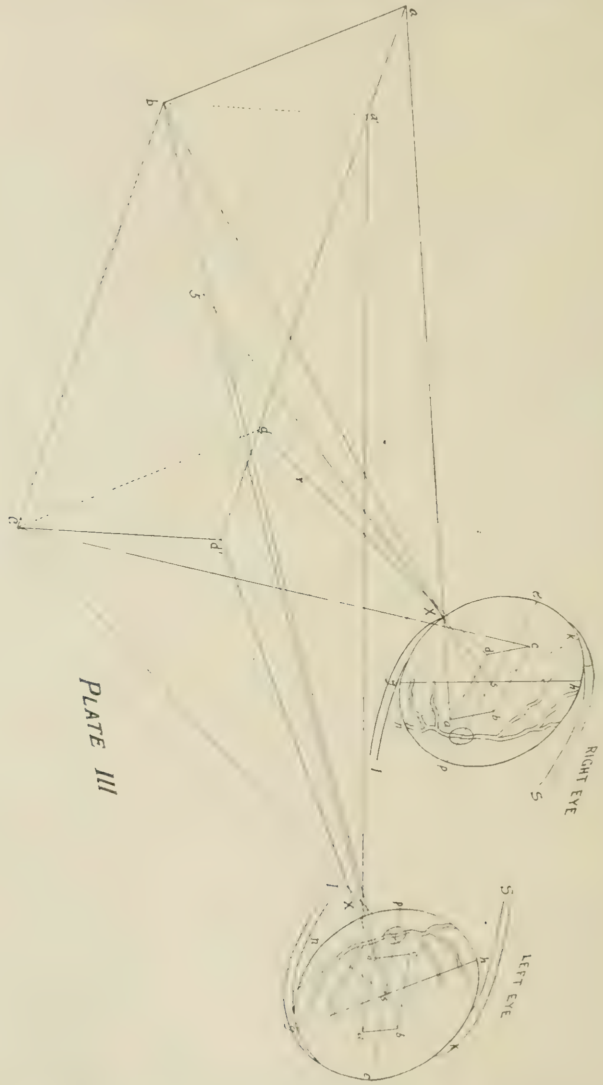
PLATE III

point. There is anarchy, so far as projection is concerned, in these eyes.

When the law of direction is interfered with, as a result of the conflict between it and the more imperious law of corresponding retinal points, the object seen is always in the position that it would have been in had the images primarily fallen on the parts of the two retinæ that have been rotated under them (by either the recti or the oblique muscles) in obedience to the supreme law of binocular single vision—the law of corresponding retinal points. The displaced images as a result of either natural or artificial means, cover areas of the two retinæ that do not correspond. In order to have binocular single vision retinal areas that do correspond, and of same shape and size as the images, must be brought under them. The object will be seen as though no rotation had taken place, as if the images had primarily fallen on these parts, in perfect obedience to the law of projection, although the lines of direction drawn from the images to the single object will not cross at the nodal point. In cases of decentration of the maculæ, and in displaced images by means of prisms, all lines of direction will cross at one point but that point will be above, below, to the outer or inner side of the true nodal point; while in oblique astigmatism, and when the axes of correcting cylinders are displaced, no three lines of direction cross at the same point.

In like manner a plate could be made showing how astigmatic eyes, with meridians of greatest curvature converging above, would see a rectangle distorted into a trapezoid, the longer side below. In each eye there would be a parallelogram image inclining down and out. To fuse these into a trapezoid the inferior oblique muscles would be brought into action in order, as far as possible, to bring corresponding retinal parts under dissimilar images, which is done the moment the obliques displace the horizontal meridians so that they become parallel with the upper and lower borders of the distorted images.

Imperfect as is binocular single vision in uncorrected oblique astigmatism, the meridians of greatest curvature either diverging or converging above, it could be effected in no other way than by a revolution of the eyes by the symmetric harmonious action of the oblique muscles. It is true that nature has one other method of preventing diplopia—mental suppression of one of the displaced images. It may be that amblyopia resulting from oblique astigmatism high in degree, and from insufficiency of the obliques, is more common than one would at first think. Certainly, if the obliques cannot do their proper work in effecting binocular single vision, in the first years of life, nothing is more reasonable than to suppose that amblyopia *ex anopsia* would develop. Who has not seen cases of amblyopia without being able to account for it?

The phenomena outlined in this paper can be demonstrated experimentally by any one who desires to prove all things; for he can produce in his own case, at pleasure, any form of astigmatism. But some may be ready to say that artificial astigmatism is one thing and natural astigmatism is another thing. This is true, but only in name. That 3 D. of artificial hypermetropic astigmatism is the same error of refraction as 3 D. of natural hypermetropic astigmatism is abundantly proved by the fact that each is thoroughly corrected by a plus three cylinder, axis properly placed. Either plus or minus cylinders may be used in the experiments, for the one is as capable of producing artificial astigmatism as the other; if the plus cylinders (3.00 D.) be used, the astigmatism produced has its meridian of greatest curvature at right angles to the axis of the cylinder, while the meridian of greatest curvature would correspond with the axis of the minus cylinders (3.00 D.) if they were used.

By either means it can be easily proved that in astigmatism of any kind (myopic, hypermetropic or mixed), whose meridians of greatest curvature diverge above, there is a necessity for action on the part of the superior oblique muscles in order to prevent diplopia. This action, having its beginning in the earliest days of infancy and continuing during waking hours until the cause is corrected or one eye is lost, converges the naturally vertical meridians above. If the meridians of greatest curvature converge above, the images of all objects are so displaced in the two eyes as to throw into activity the inferior obliques so that diplopia may be prevented.

In astigmatism with the principal meridians vertical and horizontal the only eye-muscles brought into action, to in any way remedy the condition, are the ciliary muscles. In oblique astigmatism with the meridians of greatest curvature diverging above, there is the same state of ciliary strain to sharpen as much as possible the images, and there is also a necessary activity of the superior obliques so as to bring corresponding parts of the two retinæ under the oblique images, that there may be binocular single vision. Again in oblique astigmatism with the meridians of greatest curvature converging above, there is the ciliary strain for sharpening the images and there is also a consequent activity of the inferior obliques so as to bring similar parts of the retinæ under the dissimilar images, resulting in binocular single vision.

When there is equality of strength of the obliques of the two eyes, vertical and horizontal astigmatism will give less trouble than when the astigmatism is oblique in either direction, and astigmatism with the meridians of greatest curvature diverging above need give no more annoyance to the patient than if these meridians converged above when the plane of vision is horizontal; for, in the former case, the superior obliques would be as able to bear the strain as would the inferior obliques in the latter condition. When the meridians of greatest curvature diverge above and the plane of vision (visual axes) is directed down, as in reading, the added strain on the superior obliques would give more annoyance than if, in the same patient, the meridians of greatest curvature converged above, for the reason that, in the latter, the simple action of the superior obliques to overcome the tendency to outward rotation of the eyes by the inferior recti would, to that extent, relieve the tension of the inferior obliques excited by the astigmatism.

But the obliques are not always harmonious. The superior obliques are insufficient in at least 25% of all cases, while the inferior obliques are insufficient in less than 1% of all cases. In cases of insufficiency of the superior obliques the vertical form of astigmatism would be worse on the patient than if he had oblique astigmatism with the meridians of greatest curvature converging above; and the worst form of astigmatism would be that in which the meridians of greatest curvature diverge above. The reverse would be true if the inferior obliques were insufficient—a rare condition.

The complicated function of the oblique muscles exists alone in cases of oblique astigmatism with meridians of greatest curvature converging or diverging, and in unequal degrees of oblique astigmatism when the meridians of greatest curvature are parallel. The necessity for this function is entirely destroyed when the astigmatism is properly corrected; but the action of the obliques does not always cease at once in binocular single vision through the correcting cylinders. The old habit of rotation often continues for hours and sometimes for days, although there is no longer a need for it, and the result is metamorphopsia. Inherent weakness of the superior oblique muscles, in a large percent. of the cases, leads to a more speedy disappearance of the metamorphopsia when the meridians of greatest curvature diverge above than when they converge. The reverse would be true in a case of insufficiency of the inferior obliques. The *habit* of action is more quickly suspended in a weak muscle than in a strong one. In all cases, however, it ceases, and the metamorphopsia vanishes, under the continuous wearing of the correcting cylinders.

Artificial conditions may excite the obliques into the performance of either their simple or complicated function, depending on the means used. A prism placed, base up, before one eye would call into action the inferior rectus of that eye. This action would tend to turn the vertical meridian out above, which tendency would be at once counteracted by action of the superior oblique so as to keep that meridian parallel with the vertical meridian of the fellow eye. A prism, with base up, before the right eye, and one with base down, before the left would call into action the inferior rectus of the right and superior rectus of the left and there would be an associated and corrective action of the superior oblique of the right and inferior oblique of the left, if the vertical meridians are to be kept vertical. In this case, however, the naturally vertical meridians being still parallel, though not vertical, are most likely allowed to remain tilted since diplopia would not result.

Prisms placed, bases out, before the eyes will call into action the internal recti, in obedience to the law of corresponding points. If these muscles are attached neither too high nor too low, other muscles will not be affected by the prisms; but if these muscles are attached too low, their forced action will tend to make the naturally vertical meridians diverge above, when a corrective action of the superior obliques becomes necessary; or if the attachment is too high, the inferior obliques act to prevent the convergence of the vertical meridians above. The indirect effect on the oblique muscles, of prisms in position of rest for weak recti muscles, may account largely for the unsatisfactory results of that once common plan of treatment.

In the rhythmic exercise treatment of the internal recti muscles, a state of insufficiency of the superior obliques is sometimes developed that was not manifest in the beginning even under the proof test. The only explanation is that the internal recti, in these cases, are attached too high and their exercise has been necessarily associated with corrective rhythmic action of the inferior obliques so that they become too strong for the superior obliques. These cases do not improve as they should until proper attention is given to the superior obliques. In only two instances have I seen insufficiency of the inferior obliques develop as a result of exercise of the interni; and it is easy to suppose that, in these cases, the interni were attached too low and that, consequently, their exercise was associated with corrective rhythmic contraction of the superior obliques, resulting in their hyperdevelopment. These cases did not do well until attention was given to the inferior obliques, in connection with the treatment of the interni.

The effect of prisms on the externi, under conditions of too high or too low attachment, would bring about a secondary effect on the obliques, precisely as has been described in connection with the interni. In either case the obliques are performing their simple function, that of keeping the naturally vertical meridians parallel.

The complicated function of the obliques may be excited by artificial means also. As already stated, artificial oblique astigmatism calls into harmonious, symmetric activity either the superior or inferior obliques, depending on the divergence or convergence above of the meridians of greatest curvature.

In the correction of any form of astigmatism the proper location for the axis of the cylinders should always be determined, as a variation in either direction would throw strain on the oblique muscles which would be badly borne in proportion to the strength of the displaced cylinders and the extent of their deviation. Several curious facts may be brought forward here; and reasons can be given why advantage should be temporarily taken of these facts in certain cases. Fig. 1, in Plate IV, represents a pair of hypermetropic astigmatic eyes, the meridians of greatest curvature being vertical in each eye. The plus cylinders, axes 90° (a), insure against strain of either the superior or inferior obliques; but let the glasses be turned in the rims so that the axis of the right shall stand at 80° (b) and the axis of the left, at 100° (b), images will be distorted as shown in Plate II, which would necessitate strain on the part of the superior oblique muscles. The distortion of the images would increase, and the strain on the superior obliques would be greater, as the axes are revolved further away from the vertical.

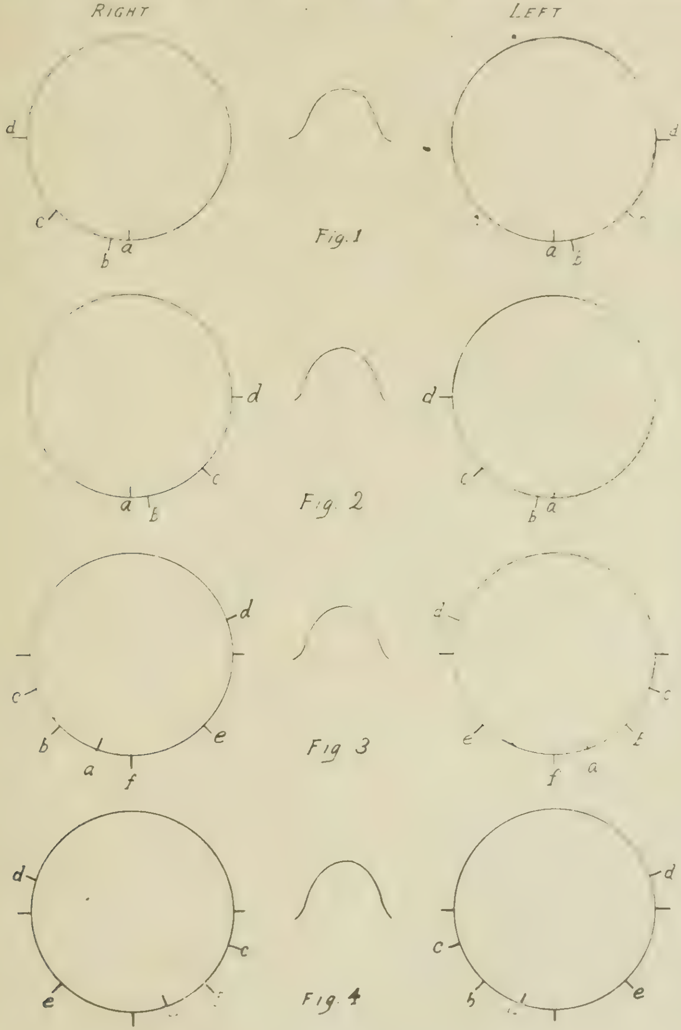

PLATE IV

the maximum being reached at 45° (c) for the right and 135° (c) for the left eye. Passing these points the distortion grows less until at 180° (d) for each eye, it disappears.

Fig. 2 represents the same pair of eyes. If now the axis of of the right cylinder should be revolved from 90° (a) to 100° (b) and that of the left from 90° (a) to 80° (b), the distortion of images would be such as to call into activity the inferior obliques so that there might be binocular single vision. This distortion would reach its maximum when the axis of the right cylinder stands at 135° (c) and that of left at 45° (c), again lessening as the axes are made to approach the horizontal, where the distortion ceases.

Fig. 3, Plate IV, represents a pair of hypermetropic astigmatic eyes with the meridian of greatest curvature for the right at 70° (a) and that of the left at 110° (a). (In all the figures of plates IV, V and VI, the mark within the circle shows the location of the meridian of greatest curvature). These meridians converging above would cause strain on the inferior obliques, which would be relieved by the correcting cylinders, axis of right at 70° (a) and of left 110° (a). A revolution of the axis of the right cylinder to 45° (b) and that of left to 135° (b) would so displace the images as to call into action the superior obliques, the displacement increasing as the axes are moved until these points (b for each eye) are reached. Continuing the revolution of the cylinders in the same directions, the displacement lessens and disappears entirely when the axis of the right reaches 20° (c) and that of the left 160° (c), and the necessity for action of the obliques no longer exists. If the axes of the cylinders are moved from their correct positions (70° for right and 110° for left eye) to 90° (f) for each eye, images will be so displaced as to call into corrective activity the inferior obliques. The maximum of displacement would be effected when the axis reaches 135° (e) in right and 45° (e) in left eye. Continuing the revolution in the same directions the displacement would grow less and finally disappear when the axis of right stands at *d*, and that of the left at *d*, each 20° above the horizontal. As will be seen the arc of distortion, so as to throw strain on the superior obliques, is 50° (from 70° to 20° in right eye, and from 110° to 160° in the left eye), while the arc of distortion that would throw strain on the inferior obliques is 130° (from a to d).

Fig. 4, Plate IV, shows the meridians of greatest curvature of these hypermetropic astigmatic eyes at 110° (a) for right and 70° (a) for left. These meridians diverging above would call into corrective activity the superior oblique muscles. Correctly chosen and properly placed cylinders, by correcting the distortion of the images, would remove the necessity for the performance of the complicated function of the superior obliques. Displacing the axes of these cylinders, the right to 135° (b) and the left to 45° (b) would cause a maximum of distortion of the images, of the kind to call into action the inferior obliques. Continuing the revolution of the cylinders, the distortion would disappear when the axis of right reaches 160° (c) and that of the left, 20° (c). Should the axes of the cylinders be revolved from their proper places (at 110° (a) in right and 70° (a) in left) to 90° (f) for each eye, the images would be so changed as to call into harmonious activity the superior obliques. The maximum distortion would occur when the axis of right is at 45° (e), and that of left, at 135° (e). Continuing the revolution the distortion would disappear when the axes reach the points *d* above the horizontal meridians. In this case the arc of distortion causing activity of the inferior obliques is 50° (from *a* to *c*) while the arc of distortion that would throw strain on the superior obliques is 130° (from *a* to *d*). If in this pair of eyes the meridians of greatest curvature had been at 130° for right and 50° for left, the arc of distortion that would call the inferior obliques into action would be only 10°, while the one that would cause activity of the superior obliques would be 170° (180° less 10°).

Fig. 1, Plate V, represents hypermetropic astigmatic eyes, the meridians of greatest curvature being at 180° (a) in each eye, a condition that, in itself, would not call either the superior or inferior obliques into activity. The correct plus cylinders, axes 180°, would sharpen the blurred but not distorted images. Displacing these axes in the lower temporal quadrants would so distort the images as to throw into action the superior obliques; and the maximum of distortion would be effected when the axes reached 45° (c) in right and 135° (c) in left eye. With the axes turned to 90° (b) there would be no distortion of images, though there would be blurring as in all cases of displaced cylinders.

Fig. 2, Plate V, represents the same pair of eyes shown in Fig. 1. The axes of the correcting cylinders revolved in the lower nasal quadrant would so distort images as to call into action the inferior oblique muscles, the maximum being effected when the axes stand at 135° (c) for the right and 45° (e) for the left eye, the distortion lessening as the axes approach, and disappearing altogether when they reach, 90° (d.)

A comparative study of Figs. 1 & 2 of Plate IV, with Figs. 1 & 2 of Plate V, will show that, in hypermetropic astigmatism with the meridians of greatest curvature either vertical or horizontal, a revolution of the axes of the cylinders in the lower temporal quadrant will distort images (as of a rectangle) down and in and thus will call into harmonious ation the superior obliques; and it will also show that a revolution of the cylinders in the lower nasal quadrants will so displace images as to call into harmonious action the inferior obliques.

Fig. 3, Plate V, represents a pair of hypermetropic astigmatic eyes with the meridian of greatest curvature for right eye at 20° (a) and that of left at 160° (a). Since these meridians converge above the uncorrected condition would cause harmonious action of the inferior obliques. Properly chosen and correctly placed cylinders, axis at 20° a) for right and 160° (a) for left eye, would relieve the distortion of the images and do away with the necessity for the complicated function of the obliques. Revolving the axis of the right cylinder from 20° (a) to 45° (b) and

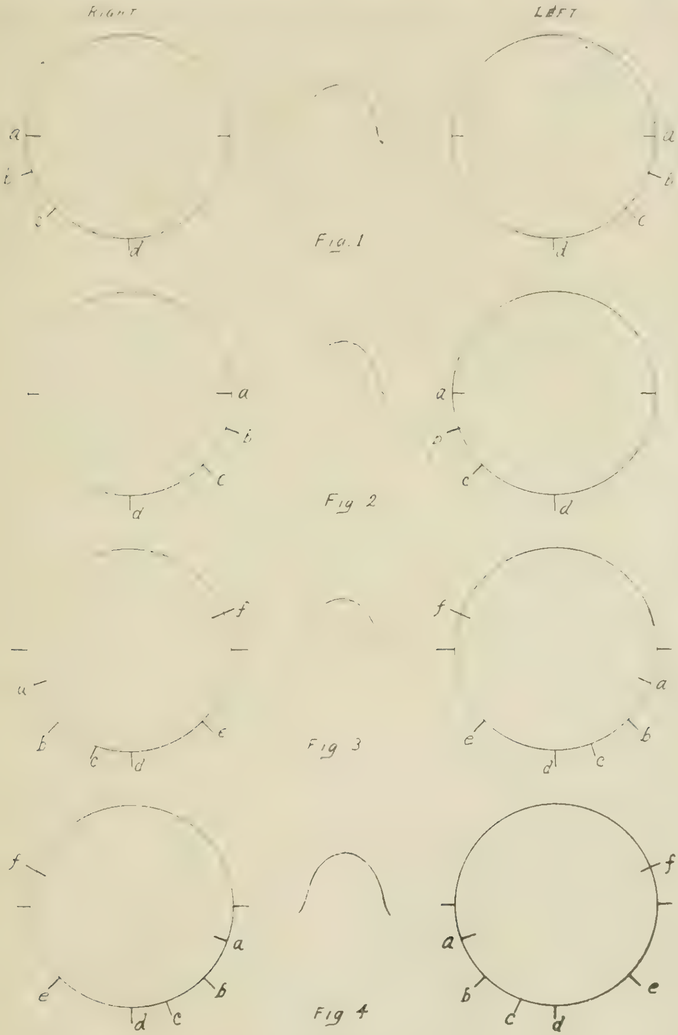

Fig. 1

Fig 2

Fig 3

Fig 4

PLATE V.

that of the left from 160° (a) to 135° (b) would cause a maximum displacement of images in such a way as to call into action the superior oblique muscles, the distortion disappearing when these axes reach 70° (c) for right and 110° (a) for left eye. Passing 70° (c) in right and 110° in left, the distortion becomes reversed so that strain will be thrown on the inferior obliques, the maximum being attained when the axis of the right stands at 135° (e) and that of the left at 45° (e). The distortion decreases as the axes are still further turned in the same directions and disappears at the end of the arc of 130° (from *c* to *f*) when they coincide with the meridians of greatest curvature. Thus the arc of distortion involving the superior obliques is 50° (from *a* to *c*) while that involving the inferior obliques is 130° from *c* to *f*).

The eyes (hypermetropic astigmatic) represented by Fig. 4, Plate V, have their meridians of greatest curvature at 160° (*a*) in the right and 20° (*a*) in the left. These meridians diverging above would result, in the uncorrected case, in calling into harmonious action the superior obliques. Proper cylinders with the axis of right at 160° (*a*) and that of left at 20° (*a*) would correct the distortion of the images and relieve the strain on the superior obliques. A turning of these cylinders in the arcs *a-c* would distort the retinal images so as to bring into action the inferior oblique muscles, the maximum distortion existing when the axes are at *b*. Continuing the revolution from *c*, the distortion becomes reversed and as a consequence the superior obliques are brought into activity, the maximum being attained when the axes reach *e*. As the axes are revolved further the distortion lessens and finally disappears when they stand at *f* again coinciding with the meridians of greatest curvature. In this pair of eyes the arc of distortion involving the inferior obliques is 50° (from *a* to *c*) while that involving the superior obliques is 130°, the maximum of distortion in both instances being attained when the half way point of the arc is reached by the axis of the cylinder.

A comparative study of any two, or of all, the Figures in Plates IV and V, will show that the arc of distortion, by corrective plus cylinders, involving the superior obliques, is always in the lower temporal quadrant wholly or in greater part, and if entirely within this quadrant, its length is always twice the distance from the meridian of greatest curvature to the 45° point of the quadrant, the other half being on the opposite side of the latter. In like manner it will be seen that the arc of distortion involving the inferior obliques by a revolution of plus cylinders is always in the lower nasal quadrant wholly or in greater part, and if entirely within the quadrant, its length is twice the distance from the meridian of greatest curvature to the 45° point of the quadrant, the other half being on the opposite side of the latter. When the arc of distortion involving the superior obliques is 90° that involving the inferior obliques is 90° and *vice versa*. When the arc of distortion involving the superior obliques is less than 90°, the arc involving the inferior obliques is always the difference between the former and 180°, and *vice versa*. The maximum of distortion is always attained when the axis of the cylinder is at the half way point of the arc.

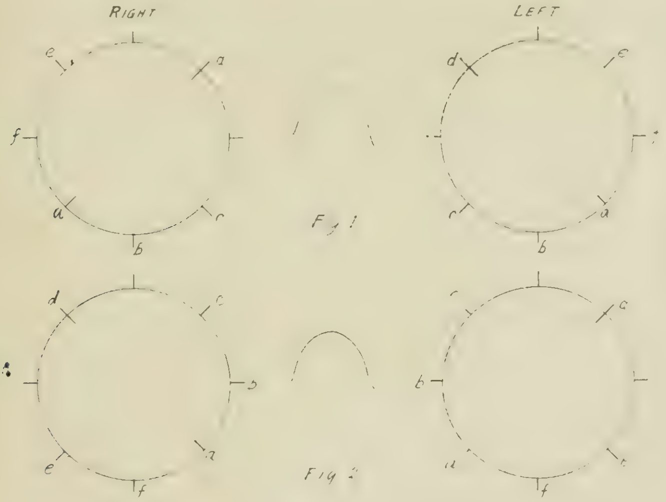

Fig. 1

Fig. 2

PLATE VI

Fig. 1, Plate VI, represents a pair of hypermetropic astigmatic eyes, the meridian of greatest curvature of the right at 45° (a) and that of left at 135° (a). These meridians converging above would cause such distortion of images as to throw into harmonious action the inferior oblique muscles. The proper cylinders correctly placed—axis of right at 45° (a) and axis of left at 135° (a)—would counteract the distortion and relieve the inferior obliques of the necessity of acting. Revolving the axes of the correcting cylinders in either direction would so distort images as to call into harmonious action the inferior oblique muscles. Since the arc of distortion for the superior obliques in this case is nothing, the arc of distortion for the inferior obliques is 180, from *a* to *d* in either direction, the maximum of distortion being attained respectively at *e* above an at *c* below.

Fig. 2, Plate VI, represents a pair of the same kind of eyes but with the meridian of greatest curvature at 135° (a) for the right and 45° (a) for the left. These meridians diverging above, the refraction is such as to distort images so as to call into harmonious action the superior obliques. As in the other case, the correct cylinders properly placed counteract the distortion and relieve the superior obliques from action. Rotating the axes of these cylinders in either direction from *a* would so distort images as to call into activity the superior obliques. In this case the arc of distortion for the inferior obliques is nothing and therefore the arc of distortion for the superior obliques is 180, from *a* to *d* in either direction, the maximum being attained at *c* above and *e* below.

A careful study of Plates IV, V, and VI, is fraught with practical importance. In all cases the exact location of the meridian of best (greatest in hypermetropic astigmatism) curvature should always be sought for with the greatest care, and may always be found; and the lens should be cut so that its axis may coincide with this meridian, although, as will be shown further on, it may not always be best to so place it, at first, in the frames. Based on the teachings of my paper on the "Harmonious Symmetric Action of the Oblique Muscles in Oblique Astigmatism," published more than three years ago, Dr. N. C. Steele, of Chattanooga, Tenn., U. S. A., formulated a perfect working rule for determining the position of the best meridian in hypermetropic astigmatism, there being in the given case no insufficiency of either oblique muscles. The fellow eye being covered, the eye under examination, no longer being dominated by the law of corresponding points, is likely at times to roll into the easy position (naturally vertical meridian becoming vertical) by a relaxation of the muscles accustomed to overacting in binocular single vision. This, of course, would cause the meridian of greatest curvature to slightly vary its position, the variation being in proportion to the amount of obliquity of the astigmatism and the quantity, but rarely, if ever, amounting to more than 5°. If the best meridian is in the lower temporal quadrant and there is doubt between two points 5° apart, the axis of the plus cylinder should be placed at the higher, if the best meridian is in the lower nasal quadrant and there is doubt between two points 5° apart, the axis of the plus cylinder should likewise be placed at the higher point. Steele's rule in all cases of oblique hypermetropic astigmatism is: "In those cases in which the axes of the proper cylinders for the two eyes diverge above, place the cylinders at those points which will give the axes the greatest divergence permitted by the tests, and in those cases in which the axes converge above, place them at the points which will give them the greatest convergence permitted by the tests."

While the above rule, in cases free from insufficiency of the oblique muscles, is a perfect one, so far as finding how the lenses should be cut is concerned, it is not, even in these cases, the rule to be followed in the immediate placing of the lenses in the frames. After a time, however, the cylinders cut according to the Steele rule should be so placed permanently.

In the case represented by Fig. 3, Plate IV, since the meridians of greatest curvature converge above, the inferior obliques have always been accustomed to over-acting while the superior obliques have to the same extent been accustomed to doing less work than would have been required of them in eyes free from oblique astigmatism. Placing the axis of right cylinder at 70° (a) and that of left at 110° (a) would at once take away the cause for over-action on the part of the inferior obliques. The necessity for work so suddenly taken from them is just as quickly transferred to the superior obliques, and as a result, in most cases, there is either suffering excited, the superior obliques responding to the new demand, or there is metamorphopsia, these muscles rebelling, for the time, against the new conditions brought about by the cylinders. Both the suffering and the metamorphopsia may be avoided by revolving the cylinders in the rims so that their axes are made to traverse the arc (a-d) of distortion for the inferior obliques to the extent of 5° to 10°. The distortion will create the necessity for action on the part of the inferior obliques of the kind to which they have always been accustomed. Since the cylinders are made to describe larger arcs than the meridians of greatest curvature are made to traverse by the action of the inferior obliques, there will not be coincidence of the axes of cylinders and meridians of greatest curvature, and vision will to that extent be blurred, though sharper than if no cylinders were on. Beginning with the cylinders thus displaced they should be revolved 1° or 2°, every second or third day, back towards the equilibrium positions of the meridians of best curvature. Each backward move will take away part of the necessity for strain of the inferior obliques, transferring the same quantity of strain to the superiors. Thus by degrees the work is transferred from the inferior obliques to the superiors, and that, too, without exciting either discomfort or metamorphopsia. In this case it would be a serious mistake to displace the axes in the arc (a-b) of distortion for the superior obliques; for, to the work transferred from the inferior to the superior obliques, there would be added the contraction necessary to harmonize the distorted images.

In like manner it could be shown that the axes of the cylinders for correcting the astigmatism represented in Fig. 4, Plate IV, should be temporarily placed 5° or 10° from their permanent places in the arcs (a-d) of distortion for the superior obliques. As in the case represented by Fig. 3, Plate IV, the axes should be gradually revolved back to their permanent resting-place.

In any case of oblique astigmatism with the meridians of greatest curvature converging above (see Fig. 3, Plate IV, Fig. 3, Plate V, and Fig. 1, Plate VI), there being no insufficiency of the inferior obliques, the axes of correcting cylinders should be temporarily displaced 5° or more within the arcs of distortion for the inferior obliques, and gradually revolved back to their proper permanent points. Since there is no arc of distortion for the superior obliques in the eyes shown in Fig. 1, Plate VI, the temporary displacement may be either up or down from *a*.

In any case of oblique astigmatism with meridians of greatest curvature diverging above (see Fig. 4, Plate IV, Fig. 4, Plate V, and Fig. 2, Plate VI) there being no insufficiency of the superior obliques, the axes of correcting cylinders should be temporarily displaced 5° or more in the arcs of distortion for the superior obliques, the backward change being effected by degrees so as to gradually transfer work from one muscle to the other. Since there is no arc of distortion for the inferior obliques in the eyes shown in Fig. 2, Plate VI, the temporary displacement of the axes may be either above or below the points *a*.

So, far in speaking of the arcs of distortion for obliques muscles, plus cylinders have been in mind. When minus cylinders are required, what would be the arc of distortion for the superior obliques, if plus cylinders were used, becomes the arc of distortion for the inferior obliques, and *vice versa.*

Unfortunately there is not always perfect equilibrium of the oblique muscles in oblique astigmatic cases. If, as is most common, there is insufficiency of the superior obliques, oblique astigmatism with meridians of greatest curvature converging above will give but little trouble as compared with astigmatism in which these meridians diverge above, and for the very good reason that in the former there is harmonious strain on the strong inferior obliques while in the latter there is harmonious strain on the weak superior obliques.

Uncorrected oblique astigmatism with meridians of greatest curvature converging above, associated with insufficiency of the superior oblique muscles, is far more endurable than is the most perfect correction of the astigmatic error that can be made, when the insufficiency itself is ignored. On the other hand, when insufficiency of the superior obliques complicates oblique astigmatism with the meridians of greatest curvature diverging above, the correcting cylinders give immediate relief and become a joy forever.

If it is important in cases of oblique astigmatism, not associated with insufficiency of the superior obliques, to temporarily displace the axes of the cylinders in the arcs of distortion for the inferior obliques, it becomes doubly necessary to do so when there is insufficiency of the superior obliques as a complication; and if these axes are ever to be revolved back so that they shall coincide with the proper principal meridians, the weak obliques must be first developed by exercise.

There is another, and very proper method of correcting oblique astigmatism, especially that form in which the meridians of greatest curvature converge above. As already pointed out, the distortion of images (meridians of greatest curvature converging) is such as to throw strain on the inferior ob lique muscles. A partial (say 1·4) correction of the astigmatism will slightly relieve the distortion of the images and will thus transfer one fourth of the strain from the inferior obliques to the superior obliques. Having used the quarter correction for a few days, a half correction might be given, when another fourth of the distortion of images is relieved and a proportionate amount of strain is again transferred from the inferior to the superior obliques. After another period of a few days a three quarter correction could be given and so on to the full correction, thus gradually giving the patient full acuity of vision, and as gradually transferring work from the inferior to the superior obliques.

DERMATITIS (PSEUDO-ERYSIPELAS) PERIOCULARIS MEDICAMENTOSA.*

By DR. EDWARD FRIDENBERG,
Ophthalmic and Aural Surgeon to the German Hospital, New York.

On November 17th, 1893, I was called to see B. S., a girl aged eleven. Her right eye had been red and somewhat painful for a few days, and an oculist had prescribed drops which proved to be a ½% watery solution of atropine sulphate and hot applications. Shortly after using the drops, the eye and surrounding tissues became swollen and tender, but treatment was continued. I found the patient apparently a healthy girl. The lids of the right eye and the cheek as far down as the angle of the mouth were swollen, edematous, reddened, and painful on pressure, the conjunctiva injected and slightly chemotic. The iris was fairly well dilated. There was considerable circumcorneal injection. The original condition was evidently an iritis. Later on it was shown to be a heredito-syphilitic kerato-iritis. The periocular inflammation, which closely resembled a commencing erysipelas, was diagnosed as a form of atropine intoxication, and the atropine collyrium was stopped, a solution of boric acid being substituted, and a cooling ointment prescribed. Five days later the swelling and redness had disappeared without desquamation: but the iris had contracted and was adherent to the lens-capsule. The necessities of the case and the opportunity to test the various mydriatics as to their local toxic action, led me to instil them as follows at different times:

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*Read before the Ophthalmological Section of the N. Y. Academy of Medicine.

1st. Cocaine in 5% solution without apparent effect. Two drops of a 3% solution of atropia alkaloid in castor oil dilated the pupil ad maximum and reproduced erysipelatous inflammation of the lids and cheek within eighteen hours; redness, edema and tenderness disappeared in about four days. One drop of a 10% watery solution of Duboisine sulphate (instilled by mistake instead of the 1% solution), caused a marked constitutional poisoning, characterized by wide dilatation of both pupils, much thirst, flushing of the entire surface, dizziness, numbness of the extremities, rapid pulse, delirium, and extreme talkativeness, but no local symptoms. 1% Duboisine solutions and 2% Homatropine solutions repeatedly instilled were not followed by either local or constitutional symptoms, beyond the dilatation of the pupil.

In looking over the literature of these cases I found that they were frequently thrown into the same category with atropine-conjunctivitis, which fact, together with the comparative rarity of this condition must serve as a justification of my paper.

Atropine conjunctivitis is a condition only observed after a prolonged local use of the drug (weeks or months), and is usually characterised by the formation of follicles in the lower cul-de-sac, and by slight blepharitis. The pseudo-erysipelas, on the contrary, is observed after a single instillation of even a weak solution of various mydriatics. It is characterized by an inflammatory edema of the lids and cheek occasionally with the formation of vesicles. If the instillation be persisted in the inflammation may spread over the face and down the neck;

the infiltration becomes brawny and constitutional disturbance, (chills and fever) are marked. (cf. article by Dr. Jul. Donath, in *Wiener Med. Wocherschrift*, 1880, No. 12, p. 313). The symptoms gradually disappear in from four to seven days after the last instillation. One of the first, if not the first, cases of this kind was observed by Dr. H. D. Noyes. (R. L. *Opth. Hosp. Rep.*, 1869, Vol. VI., Part 3, p. 209). The patient, a man aged sixty-one years, had used a very dilute solution of atropine for many months. A 2 gr. solution was instilled to facilitate ophthalmoscopic examination. "Next day," says the author, "there was a smart conjunctivitis with erythema of cheek and lids. The patient told me he was used to this, that such was always the effect of atropine, and he used a dilute solution of iodine to control it. In a few days the attack passed away. After an operation a mydriatic was needed. Daturine was almost as irritating as atropine. Finally a 4 grain solution of hyoscyamine was found to be tolerated. The employment of extract of belladonna to the forehead caused erythema as readily as atropine in the eye.

Other mydriatics occasionally have similar effects. G. M. Gould (on a case of homatropine susceptibility, *Philadelphia Medical News*, Jan. 21, 1893), relates the following case: "I lately had a patient, a lady about thirty years of age, who showed an extreme idiosyncrasy as regards homatropine. For purposes of mydriasis, I dropped into each conjunctival sac a tiny drop of a solution (Merck's manufacture), gr. viii ad oz. i, four times, at intervals of from five to ten minutes. I habitually instil only a portion of a full-sized drop, by extruding this amount at the end of the dropper, and lightly touching the conjunctiva with it. The entire eight droplets would consequently not equal more than one or two of the usual size. In consideration of this fact, and also deducting the amount wiped away with tears or otherwise not absorbed, the total quantity of the drug absorbed must have been infinitesinally small. The following morning the patient's lids were swollen almost shut, and the cheeks for two inches below the eyes were puffy and highly discolored; the skin of the back, chest, arms, and legs was erythematous, and there was general prickly heat with great itching. The effects passed off in twenty-four hours. The patient informed me that similar symptoms had several times resulted from the use of belladonna plasters."

E. Treacher Collins (R. L. O. H. Reports, 1888, July, p. 164), under the heading "Atropine Irritation," describes a case of swelling of the lids and conjunctival injection in a man aged fifty-six, after one drop of a 2 gr. atropine solution, in which Duboisine also caused irritation; and another of swelling and redness of lids, and conjunctival injection in a woman aged sixty-nine after one drop of a 2 gr. atropine solution, which disappeared while hyoscyamine gr. ii solution was used, but reappeared after an instillation of Duboisine, 2 gr. solution.

The effect of daturine was noted in Noyes' case above detailed E. Gruening (oral communication), saw this condition following an instillation of cocaine in a man aged thirty-four, who had just recovered from a pseudo-erysipelas, due to the use of atropine. That no cases have yet been observed (or at least published), after Hyoscine and Hyoscyamine, is probably due to the restricted local use of these mydriatics.

The term pseudo-erysipelas seems to me to be justified by the local appearances. In fact this very condition has been diagnosed and treated as true erysipelas by competent observers. Thus Lawson (Royal Ophthal. Hosp. Rep., 1869, vi, p. 119), instilled a ⅕% atropine solution into the pupil of a patient, in whose eye some soft lenticular matter had remained after cataract operation. The eye became very painful with the lids swollen, and on the following day a distinct *erysipelatous* blush was seen over the lids and extending down the face. He says, "As I have never seen *erysipelas* following the extraction of an opaque lens or the use of atropine in the eye, I regarded its occurrence as an accidental circumstance, but as the drops gave pain they were stopped, and a lotion of the extract of belladonna was substituted. The *Erysipelas*, however, increased, spreading over the head and forehead and down the face. The belladonna lotion was shortly afterward discontinued, as with the swelling of the lids it was not only useless but seemed to give pain. All the severe symptoms now abated, and the patient soon recovered, but with the pupil closed by opaque capsule. About six months afterward the gentleman called on me at my house, as I wished to examine the eye previous to performing a needle operation. In order to ascertain how much the pupil would dilate, I dropped into the eye two drops of a solution of atrop. sulph. gr. ii ad aq. oz. i. I had not at that time connected erysipelas with the use of the belladonna, and was quite unprepared for the symptoms which were to follow. Very shortly after I had put the atropine in the eye he complained of pain, which steadily increased, and about four hours afterwards the lids began to swell, and a distinct erysipelatous blister showed itself. By the following morning he was unable to open the lids on account of their swollen state, and there was a diffuse form of erysipelas extending from the lids over the brow and face. . . . In this patient the relationship between the cause and effect was so manifest that there could be no doubt that the *erysipelas* was solely due to atropine."

Julien J. Chisolm (*Maryland Med. Journal*, 1881–2, p. 375. A singular case of hostility to the local use of atropine and duboisine, the first causing facial erysipelas, the second, temporary insanity in a patient seventy years of age) treated the irritation following atropine instillation as facial erysipelas with tinct. of iron twice. After a third attack the causal connection was recognized. Desquamation followed each attack. Duboisine (4 gr. sol.) was freely used with no local symptoms. After appreciating the singular phenomena induced by the local action of atropine, he tested its irritation repeatedly and brought on swelling of the lids and cheek by a single instillation of a 1% solution of the sulphite of atropine.

Wallace (*University Med. Magazine*, Philadelphia, Pa., 1892, rep. in Sajous) reports a case, where a drop of atropia solution introduced into the eye to correct astigmatism, produced an *erysipelatous* inflammation of the eyelids and face.

W. J. Tyson Folkestone (*Brit. Med. Journal*, Oct. 26, 1889), says, "I have seen erysipelatous skin affections of the face following local applications of atropine to the eyes."

Williams (rev. in Hirschberg's Centralblatt, Aug. 1888, p. 109) describes an "erysipelatous" inflammation and swelling of the skin resulting from the use of atropine.

The condition is further described as "herpes (following the external use of belladonna to an inflamed knee joint) with a good deal of swelling over the seat of the application," by Mackintosh, (*Brit. Med. Journal*, Oct. 17, 1885). Two months later the patient was ordered a solution of atropine for iritis. Some of the solution ran over the cheek (sic! and was in a few hours followed by a herpetic eruption of exactly the same character. The swelling was so great that the eye was completely closed.

Fialkowski (Hirschberg's Centralbl. Suppl. 1883, p. 319), speaks of it as erythema and eczema of the eyelids. Donath, (loc. citato) as erysipelatous redness of the lids and eczema of the face and neck.

Soelberg Wells (Handbook, London, 1870, p. 99), states: "I have seen instances in which a drop of a weak and quite pure solution of atropine has produced great irritation and pain or even an erysipelatous condition of eyelid and cheek, accompanied by redness and chemotic swelling of the conjunctiva."

As to the frequency of this peculiar condition, after a careful search through the literature of the subject, I have found but one case from homatropine, one from daturine, one from cocaine, and three from duboisine, (2 of Collins, v. supra, and one of Schenkl. Prag. Med. Woch., 1880, No. 19, p. 181). Though more frequently observed afther atropine instillations, it is still very rare.

Hirschberg (Realencyplopaedie gesamnnten Heilkunde, II, No. 2, 1885) speaks of it as "ueberaus selten," exceedingly rare and has apparently not met with a case himself. In the textbooks of Noyes, 1892; Oliver and Norris, 1893; Schmidt-Rimpler, 1893, it is not described. DeSchweinitz, 1892, does not differentiate it from the ordinary granular atropine conjunctivitis. Fuchs (transl. by Duane 1892), 1889, notes its occurrence in some individuals, while P. A. Morrow, (Drug Eruption, 1887), refers to it as a clinical fact familiar to ophthalmologists.

Conclusions—Pseudo-erysipelas, a condition simulating true erysipelas, but not related to it either etiologically or pathologically is met with after the instillation of various mydriatics into healthy or diseased eyes. It may be induced by only one of this group of drugs or by several. It constitutes what we may call a local idiosyncrasy, not to be comfounded with the ordinary constitutional susceptibility to the action of mydriatics. This idiosyncrasy seems to be congenital in most cases. In Chisolm's case (v. supra) it was acquired. It apparently does not affect the gouty more frequently than any other class.

2019 Fifth Ave.

SECTION ON OPTHALMOLOGY, A. M. A., BALTIMORE MEETING.

Preliminary program of the Section on Ophthalmology of the American Medical Association for the Baltimore meeting:

1. Address of the Chairman, Edward Jackson, Denver, Colo.

2. Incipient cataract, by A. R. Baker, Cleveland, Ohio. Discussion opened by Bœrne Bettman, Chicago, Ill.

3. The Operation for secondary cataract, by J. W. Thompson, Kansas City, Mo.

4. The Operative treatment of immature and some forms of zonular cataract, by J. E. Weeks, New York, N. Y.

Discussion on Cataract opened by Bœrne Bettman, Chicago, Ill., and G. E. Frothingham, Detroit, at H. Knapp, N. Y.

5. Case of congenital ectopia lentis with diplopia by F. C. Hotz, Chicago, Ill.

6. Ectopia lentis, by F. B. Tiffany, Kansas City, Mo. Discussion on ectopia lentis opened by Harold Gifford, Omaha, Neb.

7. Symposium on plastic operations about the eye (a series of five minute paper):

(a) Skin grafting on the eyelids, by F. C. Hotz, Chicago, Ill.

(b) The restoration of the eyelids with sliding flaps, by W. C. Tyree, Kansas City, Mo.

(c) Practical points in anesthesia for plastic operations about the eye, by M. W. Zimmerman, Philadelphia, Pa.

(d) Transplantation of skin in plastic operatians on the eyelids, by Walter B. Johnson, Patterson, N. Y.

(e) Blepharoplasty without a pedicle, by Eugene Smith, Detroit.

(f) Transplantation of a strip of skin in intermarginal space of lids, by H. Knapp, N. Y.

(g) Some cases of restoration of eyelids by plastic operations with exhibition of patients, by Herbert Harlan, Baltimore.

Discussion opened by R. A. Reeves, Toronto, and Swan M. Burnett, Washington.

8. Symposium on operations on the ocular muscles (a series of five minute papers):

(a) The indications for and the advantages and technique of muscle shortening, by G. C. Savage, Nashville, Tenn.

(b) The slight effects sometimes produced as the results of free tenotomies of the ocular muscles for heterophoria, by S. Theobald, Baltimore, Md.

(c) The technique of tenotomy of the ocular muscles, by L. Connor, Detroit, Mich.

(d) The limitations of tenotomy of the ocular muscles, by H. F. Hansell, Philadelphia, Pa.

(e) Tendon advancement with a special indication for its employment, by C. H. Thomas, Philadelphia, Pa.

Discussion opened by G. T. Stevens, New York, and S. D. Risley, Philadelphia, Pa.

9. Hysterical affections of the eye muscles, by H. Gradle, Chicago, Ill.

10. Strabismus, by C. M. Hobby, Iowa City, Ia.

11. To what extent should recently suggested methods of muscular exercise displace tenotomy in the treatment of heterophoria, by Hiram Woods, Baltimore.

12. Some remarks on paralysis of the superior rectus muscle, by Ed. J. Bernstein, Baltimore.

13. Practical points gained in the treatment of one thousand cases of insufficiency of the ocular muscles, by J. W. Park, Harrisburg, Pa.

Discussion opened by J. F. Fulton, St. Paul; L. Connor, Detroit, and S. Theobald, Baltimore.

14. A new and almost bloodless enucleation operation, by Bœrne Bettman, Chicago, Ill.

15. Evisceration of the eyeball, by L. Webster Fox, Philadelphia, Pa.

Discussion opened by S. D. Risley and G. O. King, Philadelphia, Pa.

16. Histologic and bacteriologic notes on some cases of penetrating wounds of the eyeball, together with experimental observations on certain bacilli found in a case of post-operative panophthalmitis, by G. E. de Schweinitz, Philadelphia, Pa.

Discussion opened by R. E. Randolph, Baltimore, Md.

17. A clinical study of the ulcerative diseases of the cornea, by S. D. Risley, Philadelphia, Pa.

Discussion opened by C. J. Kipp, Newark, N. J.

18. The infiltration method of anesthesia in ophthalmic practice, with demonstration, by Harry V. Wurdemann, Milwaukee, Wis.

Discussion opened by Harry Freidenwald, Baltimore, Md., and Carl Koller, N. Y.

19. Report of committee on the scientific and hygienic value of examining the eyes in the schools, by B. Alex. Randall, Philadelphia, Chairman W. F. Southard, San Francisco, and others.

20. The use of prisms to increase vision in the formation of new maculæ in conical and leuchomatous corneæ, etc., by G. M. Gould, Philadelphia, Pa.

Discussion opened by T. H. Fenton, Philadelphia, Pa.

21. The percentage of symmetrical and a symmetrical meridiæ of the cornea in astigmatic eyes, by S. D. Risley, and J. L. Thorington, Philadelphia, Pa.

22. Two thousand five hundred cases of ocular headaches and the different states of refraction connected therewith, by W. F. Mittendorf, New York.

23. A study of the refraction of one thousand five hundred eyes, by H. Bert Ellis, Los Angeles, Cal.

24. Latent astigmatism, by W. H. Starkey, Chicago.

Discussion opened by W. H. Wilder, Chicago, Ill.

25. Anisometropia, by W. F. Southard, San Francisco.

Discussion opened by S. D. Risley, Philadelphia, Pa.

26. Some rare complications of infantile purulent conjunctivitis, by A. A. Hubbell, Buffalo, N. Y.

Discussion opened by B. Alex. Randall, Philadelphia, Pa.

27. Retrobulbar tumor, by S. C. Ayres, Cincinnati, O.

Discussion opened by J. A. White, Richmond, Va.

28. A case of enchondroma of the cartilage of the upper lid, by P. D. Keyser, Philadelphia, Pa.

29. Extensive changes in the choroid, with report of cases, by J. T. Carpenter, Jr., Philadelphia, Pa.

30. Anomalies in ophthalmic practice, by A. C. Corr, Carlinsville, Ind.

31. The relationship between eye and brain, by J. A. Lydston, Chicago, Ill.

32. Eight years' experience with the surgical treatment of trachoma, by H. Gifford, Omaha, Neb.

33. Hemorrhages into the retina and vitreous in young persons associated with evident disease of the retinal blood vessels; remarks on the formation of vessels into the vitreous and in a case of emigrating subhyaloid hemorrhage, by Harry Friedenwald, Baltimore, Md.

34. Formalin as a preservative agent of eye specimens, by W. H. Wilder, Chicago, Ill.

Discussion opened by F. C. Hotz, Chicago, Ill.

H. V. Wurdemann,
Secretary.

Since the above was put in type the following papers have been promised:

35. A new keratometer, by D. S. Reynolds, Louisville.

36. Ophthalmioplegia interna, by B. L. Milliken, Cleveland.

37. Observations upon the age of the negro with special reference to the refraction, ocular muscles, and color vision, by C. W. Kollock, Charleston, S. C.

38. On the general and local conditions that change corneal curvature, by L. J. Lautenback, Philadelphia.

39. Anisometropia by W. F. Southard, San Francisco.

40. Report of a case of traumatic varix of the orbit in which ligation of the left common caroted was performed, by C. A. Oliver, Philadelphia.

41. Some rare cases of infantile purulent conjunctivitis, by A. A. Hubbell, Buffalo.

42. Report of committee on legislation for the prevention of blindness, by Lucian Howe, Buffalo.

43. Extensive colloid changes in choriod, by J. T. Carpenter, Jr., Philadelphia.

44. Prognostic significance of albuminuric retinitis, by E. O. Belt, Washington.

THE OPHTHALMIC RECORD,
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G. C. SAVAGE, M.D., Editor and Publisher,
710 CHURCH STREET, NASHVILLE, TENN.

English Edition of Annales d'Oculistique.

American Oculists are to be congratulated that they are to have an edition, in their own language, of the above named live French Journal. The American editor, Dr. Geo. T. Stevens, is too well known in this country to need any introduction from us. That he will ably perform his new duties, none can doubt. Success will attend this new venture.

The Buffalo Medical and Surgical Journal

Is now fifty years old. It will enter on the work of the last half of its first century enlarged and otherwise improved. Our friend, Dr. A. A. Hubbell, has been made an associate editor, which insures that the Ophthalmic part of the journal will be kept up to date. Altogether the JOURNAL is one of the best monthlies published.

Let us all go to Baltimore

To attend the meetings of the Section of Ophthalmology of the A. M. A. The Section will convene for work at 2 p.m., May 7th, and the meeting will continue four days. At 7 p.m. on the 7th will occur the annual dinner of the Section. Look over the program as published in this issue, and see if you can afford to stay away. Chairman Jackson and Secretary Wurdmann have done good work.

A New Professor for Jefferson College.

Dr. Wm. Thomson, our first teacher in Ophthalmology, has been given the chair of didactic Ophthalmology in the Jefferson Medical College. It is strange that this step was not taken long ago by this progressive school. Clinical ophthalmology without didactic teaching cannot be very effective. Both Dr. Thomson and the college authorities are to be congratulated.

THE
OPHTHALMIC RECORD.

VOL. IV. MAY, 1895. NO. 11.

THE EIGHTH PERIODICAL INTERNATIONAL OPHTHALMOLOGICAL CONGRESS, HELD AT EDINBURGH, AUGUST 7-11, 1894.*

By ALVIN A. HUBBELL, M. D.

(Supplementary report.)

ADDITIONAL PAPERS.

Since my report of the Congress was completed, the official transactions have been received. These include other communications which were presented to the Congress, but not read, and they are of such importance that abstracts of them are hereby appended.

TITLE OF PAPERS.

51. The treatment of recurrent vascular ulcers of the cornea and phlyctenular pannus, by DR. M'GILLIVRAY, of Dundee.

52. Notes on a case of implantation of eyelash in the anterior chamber, by DR. M'GILLIVRAY, of Dundee.

53. Degrees of astigmatism, however low, when they annoy should be corrected, by DR. CHISOLM, of Baltimore, Md.

54. Two cases of spontaneous recurring intraocular hemorrhage, by DR. TAYLOR, of Norwich.

55. A problem in neurology—Peculiar iris-reaction with postneuritic atrophy, by DR. GOULD, of Philadelphia, Pa.

56. The treatment of conical cornea by the thermo-cautery, by DR. EMRYS-JONES, of Manchester.

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*From the *Buffalo Medical and Surgical Journal.*

57. Operative procedure for distichiasis, by Dr. Germaix, of Algiers.

58. Pseudo-membranous conjunctivitis and its clinical forms in Egypt, by Dr. Sameh, of Cairo.

59. Javal's ophthalmometer employed for exophthalmometry and ophthalmostatometry, by Dr. Antonelli, of Naples.

60. Simple and combined sclerotomy, by Dr. DeWecker, of Paris.

61. On strabismus, especially strabismus of adolescents in relation to head-conformation, by Dr. Weiss, of Heidelberg.

ABSTRACTS OF PAPERS.

M'Gillivray (51) treats phlyctenular pannus and ulcers of the cornea with an ointment composed of atropine (alkaloid), yellow oxide of mercury, and cocaine (alkaloid) in the proportion of grains i, ii, iii, respectively, with vaseline or lanoline as a base. The ointment may be applied every two hours, to commence with, and gradually lessening the number of applications after healing has commenced.

M'Gillivray (52) also described a case in which a blow had been received on the right eye, nineteen days before the first examination. There was an irregularly shaped leucoma situated horizontally, and a little below the center of the cornea, and lying vertically in the anterior chamber was an eyelash which was adherent by one end to the center of the corneal cicatrix, while the other end rested on the anterior surface of the iris near the angle of the anterior chamber. Removal of the eyelash was refused, and eighteen months after the injury there was no appearance of irritation, and the vision was the same as that of the left eye.

Chisolm (53) protested against two statements of very general acceptance, viz., that irregular curvatures of the cornea, measuring less than 1.00 D., are not worthy of recognition, and that persons who have $V = \frac{20}{20}$ in each eye cannot have astigmatism. He had found that an astigmatism of 0.25 D., often causes serious eye disturbances, and should then be corrected. "Headache with eye-discomforts in young, healthy looking people, who are not troubled during periods of eye-rest, means a low degree of annoying astigmatism."

Taylor (54) detailed two cases of that rare disease, spontaneous recurring intraocular hemorrhage. In an acute attack, he advised keeping the patient absolutely quiet, with head raised and ice applied to the eye; and giving large doses of astringents, and possibly, when pulse is hard and full, applying three or four leeches near the outer canthus, or, if the pulse has low tension, administering digitalis. Afterwards, ferruginous aperients may be used and the eye shaded and given prolonged rest.

Gould (55) reported a case of a girl twelve years old, who became totally blind from a most intense neuroretinitis in both eyes, followed by an absolute, white atrophy of both optic nerves, and in which there was stabile mydriasis. "The most brilliant and concentrated light thrown suddenly or continuously on the pupil failed utterly to elicit iris-reaction or perception-response. But by seating the child before an open window, the street in front being illumined by sunlight or diffuse daylight, within half a minute or more, the pupils were found to be of normal size." The parents had noticed the same effect when the child was out of doors. The contraction of the pupil was slow, and so was the widening, when the patient's face was turned from the window. The mechanism by which this phenomenon was produced was a problem which suggested several queries.

Emrys-Jones (56) treats conical cornea with the thermo-cautery as follows: Fully dilate the pupil with atropine, anesthetize the cornea with a four per cent. solution of cocaine, and apply Paquelin's thermo-cautery with a moderately small point at red-heat, a little to the outside of the tip of the cone with great caution till the cornea is perforated, as shown by the escape of a thin spray of aqueous humor. The eye is then bandaged, the patient kept as much as possible on his back, and the pupil widely dilated. The burn becomes healed in seven to twenty-one days. In time the operation may be repeated, if the cones do not disappear after the first operation. Most excellent results were reported.

Germaix (57) operates for distichiasis by a combination of several known procedures. He splits the edge of the lid sufficiently high to raise the anterior segment containing the ciliary roots till the cartilage beneath is exposed six to seven millimeters. A crescent-shaped piece of skin is also resected from the lid above, more or less wide, according to the laxity of the lids. Four sutures are then passed underneath and around the ciliary flap, so as to embrace it, and these are loosely drawn so as to raise and shorten the flap without strangling it and are tied in front. The cicatrization between this flap and the superior part of the lid is allowed to take place without sutures by simple contact. The threads are removed on the third to the sixth day.

Sameh (58) contributes a long article on the clinical history and treatment of pseudo-membranous conjunctivitis as seen in Egypt.*

Antonelli (59) described a new application of the ophthalmometer to the measurements of exophthalmos, whether pulsating or not, differences of level of the two eyes, the amplitude, frequence, and direction of oscillations in nystagmus, etc., and various defects of position of the eyes. As an aid in determining some of these conditions, he has added an ingenious attachment to the ophthalmometer, which he calls the "ophthalmostatophantom." This he fully describes and illustrates.

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*There was a good deal of "threshing old straw" at the meeting, but the offering of this article was perhaps the most audacious effrontery of all. This paper had been read at the French Ophthalmological Society, May 10, 1894, and may be found *verbatim* in the "*Bulletins et Memoires de la Societe Francaise d'Ophthalmologie,*" 1894, p. 318.

DeWecker (60) presented an interesting paper on simple and combined sclerotomy for glaucoma. After relating something of the history of simple sclerotomy and operative iridodialysis, he says: "The ideal operation in glaucoma is evidently a large scleral incision combined with iridodialysis running the whole length of the cicatrix formed in the trabecular pericorneal tissue." This operation, which he terms "combined sclerotomy," he describes as follows: "After having put the eye fully under influence of eserine, and having instilled, twice only, and that immediately before the operation, one drop of a two per cent solution of cocaine, I introduce my knife, which is six mm. wide, up to the shoulder with which it is provided, at a point one mm. from the transparent border of the cornea, and I generally choose the point lying in the prolonged vertical diameter. Having allowed the aqueous humor to drain off very slowly so as to avoid any prolapse, I insert a very delicate pair of iridectomy forceps into the wound, of which the convex extremities of the blades are carefully rounded so as not to present the least roughness. As soon as the closed extremities are seen at a distance of two mm. from the corneal border, I open the forceps and seize the iris close to the periphery, and I very gently push back the part seized along the posterior surface of the cornea towards the center of the latter. A fairly free hemorrhage generally indicates the detachment, and, as the field of operation may be obscured by blood, one must bear in mind that the forceps, contrary to what one is accustomed to do, must be withdrawn with the blades *open*.

Weiss (61) has made extensive measurement of the face and head in patients affected with strabismus, and finds that these are different in cases of the convergent form from those of the divergent.

The head-diameters, "temporal, aural, greatest zygomatic" are taken, and the difference between the inner and outer orbital edges, the angle of inclination of the orbital entrance, the pupillary distance, the distance of the "corneal vertex" from the external orbital margin are determined. In divergent strabismus he found that the planes of the sides of the face are directed more exactly forwards (parallel), while in convergent strabismus these planes converge anteriorly, more or less. He also found that in children with hypermetropia the axes of the orbits are directed forwards more exactly parallel, while in myopic children they diverge. He believes that these conformations as determined by the measurements which he describes have a practical bearing upon the treatment of strabismus in children, and should always be taken into consideration.

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY OF THE A. M. A., SAN FRANCISCO MEETING, 1894.

Papers in abstract, discussions in full.

SCHOOL CHILDREN'S EYES—A PLEA FOR THE EXAMINATION OF EVERY CHILD'S EYES, WHEN COMMENCING TO ATTEND SCHOOL.

By W. F. SOUTHARD, M. D. of San Francisco, Cal.

"Looking over the annual report of the public schools of the city of San Francisco for the year 1893, I find that there was an average daily attendance of 31,002 pupils between the ages of 5 and 17. Of this number 69 and sixty-three-hundredths per cent. were in the primary grades. This includes all children between 5 and 10 years of age. Twenty-six and six-hundredths per cent. were pupils in the grammar grades, while but 4 and thirty-one-hundredths per cent. were high school pupils. These pupils between say, the ages of 10 and 17, were divided between the grammar grade and the high school. I wish to emphasize the point that, though this does not state the total enrollment of pupils, it does very correctly give the daily attendance throughout the year. An analysis of these figures will give us some very important results. In the first place, you will observe that from the primary grades over one-half, or 50 and forty-three-hundredths per cent., fail to enter the grammar grades. These children at this time are about 10 years of age. At the close of the grammar grades, 71 and sixty-eight-hundredths per cent., or more than three-fourths, fail to enter the high school.

"Finally, to show more vividly the enormous decrease of school attendance between the tenth and seventeenth years, we learn that there is a total loss of 96 per cent. as between the primary school attendance and the high school attendance. Let us see if we can discover the cause for such a tremendous variation in attendance between the three departments of our public schools. We shall find, I think, that not one only, but many circumstances, conspire to bring about these results. The average person will be very likely to say that removals, deaths, sickness and discouragement ought to be a sufficient explanation. I am sure that a more thoughtful examination into the causes will convince us, that not only the above mentioned, but other reasons exist for such a condition of affairs. To my mind this fact is a cause for greater surprise and alarm than that but 4 per cent. of our primary pupils reach the high school, insignificant as is that number. At the age when pupils enter high school a very large number are withdrawn to become wage earners; they must assist in providing for the family. A very large percentage of the parents of these pupils think that completion of the grammar grade is all that their children need to fit them for all ordinary vocations. But this can not be the case at 10 years of age, for the percentage of permanent bread winners of 10 or 12 years of age must be very small in this State.

"We find on examination, that is, by questioning teachers, superintendents and those who are daily brought into contact with children, that the number dropping out because of their inability to keep up in their studies must be very large. It is possible that as we examine this particular cause for loss more carefully, we may discover the very material we are after by which our proposition may be maintained. I have held for some time in my arguments with educators, that if curves showing the mental capacity of a thousand children of the same age, could be drawn, they would show but a very slight variation one side or the other from a given mean. I believe that we shall find that the brain capacity of our children can be measured with as good results as we have obtained in other branches of anthropometry, a study which has been brought to a very high degree of accuracy. For example, Prof. Bowditch, of Harvard University, Prof. Gihon, of Annapolis, and Prof. Hitchcock, of Amherst, have together measured some 40,000 persons between the ages of 5 and 25; the design being to show the rate of growth of the body, for the different ages. From these measurements a certain mean standard of physical development, height, weight, chest measurement, length of body, sitting and standing, etc., to which the great majority nearly attain, has been found. The deviation above or below this mean is found to be about the same.

* * * * * *

"There is again, a large percentage who fall out of the ranks from among the apparently healthiest and brightest children. For a term or two they may have no trouble, but later on they drop behind, when they in turn become discouraged. We are able to positively state that they have no impoverished bodies, that they have always been well and have never complained before going to school. As they fall behind their classmates they are called mischievous, stupid, and other epithets of like character are bestowed upon them. Many of these children come home every afternoon complaining of headache, or if they have no headache they complain of feeling tired; they get listless and hang about the house. They are being constantly corrected for not paying attention. In fact one of the most frequent complaints from teachers is, that such children never look upon the work before them more than a moment or two at a time. They are being constantly diverted to whatever is going on about them. It is needless to ask what is the outcome of this condition; the teachers get impatient and become constant fault finders, the child gets discouraged, and the parents in many cases become dissatisfied and remove their children from school. It is among just such material as this that we find the evidences which confirm us in our theory that there can be but one way to treat this whole subject. We find that the very largest proportion of these children have errors of refraction or some disturbance of the visual organ.

* * * * * *

"In pursuing this subject of our public schools a little further we have to note that in the primary grades there was enrolled at the commencement of the year a number equal to thirty-two and thirty-five hundredths in excess of the number in regular attendance. They mostly dropped out during the first two or three weeks of school. Such a number of units thrown upon the community unable to read or write must become in time a serious burden upon it. I am most firmly convinced from personal observation that poor eyes must be a leading factor in causing this great loss. A law compelling a rigid examination of the eyes of every child when he begins to go to school would seem to be demanded. Let every child come to school bearing a certificate stating the exact condition of its eyes. By such means the teacher will be put in posession of facts which will be of inestimable use to him and to his pupils. A plan so simple ought to commend itself to every physician, to every educator and to every parent.

* * * * * *

"In my examination of the eyes of the students of the University of California, for the past five years, I found that the percentage of refractive errors was 68 per cent. Of this number only 6 per cent were myopic. In a detailed analysis of 1,300 errors of refraction I have shown that 75 per cent. were hyperopic in some degree. I found in looking over the list of symptoms attending these cases that pain of eyes, headache, muscular spasms and nervous symptoms generally were confined to this class of cases. The myope but rarely complains of anything more than inability to see at a distance."

DISCUSSION.

DR. MILLER, Los Angeles.—This subject is of great importance. The too familiar statistics of Germany are highly instructive. While examination of the eyes of young school children is highly important we, must inquire still farther as to the causes of these troubles. I am not satisfied in my own mind just what those causes are. Our people seem to be becoming more and more neurotic. Children living in cities should have more outdoor exercise. The result of our higher state of civilization is to develop a decidedly neurotic state in our entire population. I think we must look well to this and develop a state of general health if possible—greater freedom and more outdoor exercises. I think also that particularly in this State the great variety of work ordinarily given to children at schools is prejudicial. It seems to me there are educators undertaking to cover too much ground, and there are too many studies in our schools requiring numerous and rapid transitions of the mind from one subject to another, and maintaining constantly a high degree of nerve tension. It takes some little time for the pupil to get his mind onto a given subject, and about the time he begins to get well under way he must suspend that and take up something else, and so on—we have a constant rapid change from one subject to another, which brings about the nervous tension. This I believe to be operative, as well as several other causes. Much more attention must be given to lighting, warming, and ventilating your school rooms. It might be well when the child enters school to have him present not only a certificate from his physician that he has no ocular impediment, but that he has no nervous or other impediment to his doing the work ordinarily done by children of a corresponding age.

Dr. L. R. Ryan, Galesburg, Ill.—I think the question is not so much to get at the cause of myopia, because that is well known among the fraternity. The main thing is to get the people to appreciate the disease and take the means to prevent it, and we have to get the people who have an influence with the children interested, especially the teachers. I can recall a great many cases where children had been forced out of school absolutely on account of defective vision; the teachers have classed them as dullards simply because they could not read or study. And it is only a few days ago that a little girl came to me almost crying because the teacher said she was lazy, and she had a very high degree of hypermetropic astigmatism. It was absolutely impossible for the little girl to study; her sister who was a twin was very bright indeed and the two were compared and she was almost driven out of school. I think we ought to enforce upon the teachers the idea of paying attention to hygienic conditions as far as the eye is concerned—to have the light properly arranged, to have the desks arranged so that the children can study in school without getting into a cramped position; to instruct them in hygienic means and to have the idea carried to the parents at home, so that everything can be arranged and they can study properly. You will find in a great many cases, especially among children of the lower classes, that the children are packed off in a dark corner and compelled to study there, while the old people are given all the advantages as far as light is concerned. I think if you will visit the great majority of our public schools and examine the hygienic arrangement as to light and desk facility you will find that they are sadly at fault. I can recall cases where the primary children have been put away down in the basement, where the light was very poor, indeed, and where it was absolutely impossible to see an ordinary pin. Then, too, I have studied the question of the arrangement of the desks.

You take the little children in the primary department and you will find that they have their chins right on the edge of the desk and the book is set at such an angle that it is absolutely impossible for them to read without getting their noses onto the books, and in writing or getting their lessons their chins will be down at this angle. (Describing the angle). Now any one who knows the question at all knows that the eyes are used under such circumstances at a very great strain, and the development of myopia is very easily produced, and I think as a Society we ought to try to get the people and especially the teachers to appreciate those hygienic conditions.

Dr. F. B. Eaton, Portland, Oregon.—Mr. Chairman: What the doctor preceding me said in his closing remarks I think has hit the main point of this matter. We are quite well aware of the injury done to the school children, but the problem is how to work upon the public. Ordinarily the public understands that the myopic eye is the product of school work. It is not, however, clear at all to the public that the hypermetropic eye, and the astigmatic eye are both of them equally productive of misery and discomfort and injustice on the part of adults to children. I hesitate myself to make a motion as far as this Section is concerned in any way that would call attention of the educational portion of our communities to the importance of having the eyes of children examined. It has occured to me and I suggested it to Dr. Southard that some such committee be appointed by this Association or by this Section to endeavor to have the various State Medical Societies formulate certain resolutions so that the various Legislatures, or at least the municipal authorities, might act upon the school teachers in such a way for the benefit of the children as we have heard this morning.

Dr. H. M. Starkey, of Chicago.—Mr. Chairman: I am very glad indeed that I am one of the few here to hear this paper of Dr. Southard's. It is a very important subject. I don't know that I can add anything to it that hasn't been entered into in the question of the general examination of the eyes of school children. I think the point of the education of teachers is a very important one. We see a great difference in teachers, and their treatment of pupils; for instance, I not infrequently have children sent to me and say the teacher told them they could not come to school again until they had their eyes examined. The teacher has seen that there is something wrong with their eyes, and having said two or three times that they should go and see a doctor and they not having done it, the teacher after a time has said: "You can not came back until you have your eyes examined and see what is the trouble." It certainly is a most important point as we all know from experience. We see the pupils ordinarily—that is if we see them at all—when they have been overtaxing the eyes which are hypermetropic or having hypermetropic astigmatism, go on for years perhaps until a permanent injury has occured. And if by precept and example or even by legislation at a later time, when we have inculcated into the public mind the necessity for such legislation, if anything can be done so that every school child in his study, whether in the public school or otherwise, shall have the eyes thoroughly tested it will be a great advance.

Dr. H. B. Young, Burlington, Iowa—Mr. Chairman: Following the line of thought suggested by Dr. Eaton and the last speaker, I desire to call the attention of the Section to the fact that in many of the states the school teachers are very strongly organized; in fact it is a compulsory organization known as the State Normal, and by addressing our communications to the State Teachers' Association we perhaps could get an entering wedge which would be very valuable in this connection. As far as I individually am concerned, I have for some years past at the invitation of our local Normal Teachers' Association, had some talk on the subject; and I think every member of this Section would be very willing to volunteer such instructive talks to the Association in his own respective district. I know I have done so upon the express invitation of the Superintendent of the Normal department.

Dr. Southard—I would like to hear from the President; I think he has had some experiences in that line.

The Chairman—It only occurs to me to say that I have had some experience in the examination of school children's eyes and I think that this subject would perhaps be a very profitable one for a special discussion such as we had this year for the objective tests, and to make that suggestion to the Nominating Committee, which I think would be the proper one to bring forward the subject at the next annual meeting. It is certainly an extremely important subject, and one which can be elucidated by general discussion—at least by general discussion we can arrive, I think, at practical means of working out the result that we want to accomplish.

Dr. Southard—I will not occupy much of the time of the Section. I am not egotistical enough to believe that I have written anything at all in this paper that is new to any of the gentlemen present. I did not expect to bring in any array of scientific data, but thought it would be well to have the subject started. There is no member of the Section but who is fully aware and well posted on all statistics that have been made, and during the past twenty years the enormous amount of the statistical matter which has been made is sufficient in itself to prove the point that there is abundance of errors. I want to bring it in shape to get an expression of opinion as to some method of procedure. I myself believe that that idea of engaging the attention of the government of municipalities is a very good method; but my purpose has been to show that the great failure is in the schools in the early age, that is the primary schools. I do not expect that we can correct it after 20 years of age; we don't expect to make changes then. We then give them glasses and let them go on as best they can. It is at the primary schools that we must commence if we are to make the change. Now the fact is as I said, I do not present any array of statistics but I simply say this: As between the primary schools in this city which have an average attendance of 31,000, and the grammar grade which is the next grade above that, and begins at 10 years of age—I say that with an average of 31,000, say up to 10 years of age, that that attendance at the next grade above, within a comparatively few weeks drops over 50 per cent. That can not be all due to the causes which I have enumerated—a desire to work, and so forth—because we don't have much of that in this State with children at that age. I have had the privilege of speaking to the State Teachers Association in this State; and several times I have talked upon the subject with different County Teachers' Associations; I have had the privilege of bringing this question in a little different but analogous form to the Stanford schools, and I have endeavored to show them that the immediate cause for a great deal of our disturbance, this inability to concentrate the mind, is that children get disturbed because they can not concentrate their minds where they ought to be able to use their eyes, for instance ten or fifteen minutes at a time, and they are the ones who deserve our sympathies whatever it may lead to. I speak of myopia in my paper, but as we know it does not exist in our country to a very large extent. A myopic child can see pretty well. It is hypermetropic and astigmatic cases and, as I have stated, the results that I have obtained are entirely under the average. When I say that hypermetropic and astigmatic cases are 75 per cent. of all, I am within the bounds of my own personal examination of those cases. And I believe this, that if we were to make a change by which we could analyze a larger percentage of the pupils through the schools up to the high school though not beyond, but to the high school point, where they are then fitted to go to work, that this is a very important point. Now I acknowledge that there are a great many other causes as Dr. Miller says; for instance, the hereditary tendency to disease is very apparent, especially among certain classes. If our Section could give some inducement to this question of the necessity for a compulsory law, there is no doubt in my mind but what the law can easily be carried out. In this State we have a compulsory law for vaccination. It is a law that does not need the approval of every member of the community, but it meets the approval of such a large number that we carry it out very effectually, and it is a law which has been passed upon by the Supreme Court as a constitutional law. Therefore it is not a law that might be put under the head of class legislation. A law which would perhaps be of greater value than even that, if we can allow such a thing, would not only meet the support of physicians and teachers and educators, but of those who are interested and who have children themselves. The methods of getting at it are to be developed later on. I am sure that it could be done, but the teachers and educators and politicians and all this class of people must have this thing brought to them by inducement of those who have had experience, such as the men in this Section have had.

In answer to a question as to what kind of certificate would be required of children, the Doctor replied as follows:

The provision should be that every child when it first comes to the primary school shall bring a certificate to the teacher; that when that child enrolls its name it shall have a certificate saying that its eyes are in a condition which will permit it to take up the ordinary course of studies that children of the same age usually do. Now it does not mean that there are to be paid oculists for every school. But it means that their eyes are normally constituted to do that, and if they are not normally constituted that they are to have glasses fitted to them to pursue the studies which children of the same age take up. You see how it is. I have found in my experience among teachers in the schools here, those so ignorant on the subject, that they have pointed out to me in the schools that such and such children were probably deficient in mental power, and I have seen those children and can call to mind several of them in fact. But there is one case that came under my observation—a child who was sent to the Home for Feeble-minded Children. That child is wearing glasses and is now one of the brightest pupils of his age. There was nothing at all the matter with the child but inability to concentrate himself upon his work; he could not see; his whole horizon was bounded by just the little about him and his contact with the world was such that he knew very little of it. He was sent to the Home for Feeble-minded Children and the intelligent man at the head of it saw at once there was eye trouble, and that was corrected at once.

(Question was asked as to re-examination.)

I have no doubt but that every five years they should be re-examined. That would be included in the law. It would be easy enough to have the thing worked up in time. The object is now to get at the point that there is a necessity and that we are in favor of this law.

REPORT ON EXAMINATIONS OF THE EYES OF 1,900 SCHOOL CHILDREN OF THE PUBLIC SCHOOLS OF SAN FRANCISCO.

By KASPER PISCHL, M.D., San Francisco.

"Since Professor Jeager, of Vienna, in 1861, had begun the first scientific examination of the eyes of school children, over 200,000 pupils in all parts of the civilized world have been examined. All those investigations have proven that myopia stands in direct proportion to the education of the people. If I venture to ask your attention for a few minutes only to hear the report of the examinations made in the schools of San Francisco, I do not pretend to show you anything new, but I hope it will be interesting enough to compare the conditions of the eyes of the children in this new country with those of other countries.

* * * * * *

"Of all the myopic pupils, 25.25 per cent. are of American parentage, 25.25 per cent. of mixed American and European parentage, and 49.50 per cent. are of European parentage. * * *

"The fact that myopia is much less prevalent here among children than in Europe, or even in the East, may be explained by their better physical development, caused by abundance of good food, due to our fertile soil, and the almost constant outdoor life permitted by our wonderful climate.

"In conclusion, I have remarked that these school examinations do not pretend to be of the exactness of the office examinations, but I consider them exact enough for statistical purposes."

DISCUSSION.

DR. S. B. DAVIS—In the Young Ladies' High School, I found many cases where astigmatism was reducing the vision to twenty two-hundredths. In some cases, their vision was practically good, and a slight correction made wonderful results. The difficulty was chiefly with those whose studies were pressing them, and we came to the conclusion before we examined 500 students in that way, they were getting their education at the expense of their sight.

DR. H. H. WEER—It strikes me that physicians assume too much in regard to the eye. If there is anything that makes an eye man tired, it is to see some one attempt to do something according to some hypothetic theory and make a dismal failure of it. I can not understand how the use of test cards is any test for hypermetropia or myopia. It strikes me that a person having astigmatism of very low degree and in ill health, would have disturbance of vision. I have been acquainted with one of the assistants of the Manhattan Eye and Ear Hospital in New York City who had a 12 D. astigmatism and never wore a glass

I would like to ask how, in determining the hypermetropia and myopia, do you dispose of the accommodation? If I remember correctly, there is a vasomotor nervous system, and I have had pupils stand up in front of me whose vasomotor and spinal nervous system were so thrilled that they had lost entire control over every spincter muscle in the body.

Now, you will all agree that one of our great troubles is our accommodation. This seems to me to be a point that should be taken into consideration in determining the hypermetropia of school children. In the dark room of the Manhattan Eye and Ear Hospital, we were requested to examine a very marked case of myopia. I examined the case with my opthalmoscope, and I pride myself on the use of it. If I see the blood vessels and the velvety appearance I turn the glass, and if the velvety appearance comes out stronger than the white lines, then I say I have not here a case of myopia. I ran up to 8 D., and got a clear perfect vision of the disc and the velvety condition of the retina. I remarked that it was a case of high degree of hypermetropia, and it was decided by the great Dr. Morrison that it was hypermetropia. There we had a patient who had been diagnosed by several physicians as myopia. That is merely a mistake. It illustrates the fact that if you rely on the test card to decide what the error is, and proncunce that child myopic and attempt to give it correction with the minus glass it would be entirely an error. There is another interrogation that I would like to make for my own information: I notice, according to the chart that as the school life advances, the conjunctivitis advances. Might not that be from eye-strain? Another thing—I have just been so unfortunate as to just conclude fitting patients, when they took a spell of sickness. Upon recovery I found that my glass was entirely useless. This brings up another matter that I wish to advance: Is not the hyperopic eye the normal eye? Is not the emmetropic eye the uncommon eye, called the normal eye?

Dr. H. B. Young—I look upon all these statistics with regard to school children with a little allowance. If we could be sure that those marked for myopia were myopia—but with the methods hitherto employed, I think there is room for doubt about it, There is but one way I can imagine, without an enormous amount of work that we can get at it with anything like accuracy, and that is that we must make ourselves expert skiascopists. I should not depend myself upon the lenses for half the cases. I believe when we get statistics by this method of examination, we will get something very much more reliable.

Dr. W. F. Southard—The fact about statistics is this, that we have had gathered up by a very large number of gentlemen in the last twenty years an enormous amount or statistical matter, which has proved that there is a vast percentage of errors from refraction existing among school children, covering the ages between 5 and 25, besides others that have been carried on in the higher schools to which I referred this morning. The point that has been established is that nearly every child of 5 years of age is hyperopic. The second point that has been established is that mopia is but rarely seen in childhood. It has also been very accurately determined that myopia is a condition which does advance step by step in school life, as we go from grade to grade.

Now, throwing aside all the statistics relating to hypermetropia and astigmatism, one phase of myopia is not so difficult to arrive at. Myopia is very much more easily determined. In fact, it is found that using the same methods which do not show myopia at five years of age, it does show a percentage of myopia increasing with each grade of school life, as we ascend from the primary schools into the grammar schools. If we take the European statistics, especially on myopia, because in Europe this examination has been more especially applied to myopia than to anything else—the most exhaustive paper written in the past ten years has been written and re-published in this country, and it covers the error of myopia more especially. I wish to call attention to the test which shows that more myopia exists in the peasant schools, and shows it to increase from grade to grade in rapid ratio in Germany. That is an important factor, whatever the methods established may have been. If we analyze the greater portion of these statistics that have been made, it is very curious that they have not given their methods of procedure more accurately, so that we could know what their methods were. I should say the work had been done by the use of a test card, and probably glasses. We have found by a less number of examinations, covering over a considerable portion of our own country, that we do have in America a vastly less percentage of myopia for the same grades than they have abroad. Dr. Shrady, of New York, in reviewing some statistics I have made, said he believed that was the result of older civilizations—that there would be found in them a much greater percentage than in the newer countries. We have a much larger per cent. in New York and Boston than here on the Pacific coast.

Now, it being certain that myopia is the accompaniment of civilization, we, as oculists, should advocate laws compelling the examination of school children. I have not much faith in examinations that are not made by ophthalmoscopic examination in the dark room. I have not examined a single patient without the use of the ophthalmoscope. I do not rely upon a test card. I think that in the entire series of examinations the test has but one value, which was to determine the equivalents. That does not determine the ametropia at all. Out of a large number of students the equivalents run to 60 and 70 per cent. and 20-20. I agree with the writer who states that ametropia is simply a stage in the progress towards myopia. I want to say that I am not particular about the statistics. I think the statistic matter is carried to the extent that we now know we have this enormous percentage of errors. The question is to know how to prevent it. I have about seven or eight hundred papers of figures in my desk that have not been tabulated, because I concluded that there is enough of that work done to show the facts, and I want to bring before the teachers and others, methods by which the troubles can be prevented in an expeditious manner. I do not think that there is any need of our having any more than a very small percentage of error, if we do examine under the proper tests. It is proven that we have an enormous percentage of children in the primary and grammar schools who are suffering from hypermetropia uncorrected. My position in regard to children's eyes is that if we are to bring about any change in those who are older, we must begin with the school children. If we have an examination made of the eyes of the school children, it is of just as much value as is the physical examination made in larger schools for the determining of their body power to study, as far as the functions go. Upon that point I have dwelt for some years, and feel it is important for us as oculists to attempt to sustain any effort to secure legislation that will obtain compulsory examination of children at school.

H. L. Burrell—Mr. Chairman, I believe that statistics of myopia in children are absolutely unreliable, unless a course of mydriatics is given.

A Member—Mr. Chairman, we did not say in our reports myopia, hypermetropia, or astigmatism. Our reports simply say "errors of vision brought out by the tests." My reports read "such a per cent., as nine, seven, six, five or one-tenth," as the case might be.

Dr. Pischl—Mr. Chairman, I started this examination in order to compare especially the myopia which I might find here with the schools in Europe. I knew from the beginning, and I said this in my paper, that in the schools I could not possibly find out the hypermetropia or the astigmatism. That can only be done in the office. It can not be done in the school room, and would not have been permitted. It would have kept the child away from the school rooms and that would have been impossible. Many of my scholars were hypermetropic or astigmatic as I said in the paper. As to those which were not, that could not be decided. But I think that the numbers for myopia are reliable. I do not think it is necessary to apply ophthalmoscope for the myopia. The trouble in the conjunctiva, or the irritation, increased with the classes to 11 per cent. showing clearly, or at least hinting that there is eye strain in many cases, and giving us the hint that not such a great portion have normal sight. They have errors which could only be corrected in the office.—The Journal.

THE IMPORTANCE OF TESTING THE VISUAL ACUITY AND THE COLOR SENSE OF SEAMEN.

By Mr. T. H. BICKERTON, Liverpool, England.

With the object of avoiding collisions at sea, the Board of Trade, in the year 1852, issued an order compelling vessels to carry bright lights and coloured lights, so as to indicate their positions to any other vessels in their neighbourhood. In 1855 Dr. Wilson, of Edinburgh, called attention to the fact that these bright and coloured lights could not prevent accidents from still occurring if the sailors employed on board were poor-sighted or colour-blind. No notice was taken of his remarks. Twenty-one years later Dr. Caldwell, surgeon on the Cunard crack passenger steamer Russia, noticed that one of the look-out men had a glass eye, and that the other man on the same watch was blind in the opposing eye. Dr. Caldwell wrote to Messrs. MacIver, who considered the suggestion to have all the look-out men tested in regard to their eyesight an excellent one, and acting upon it they wrote to each captain and surgeon in ther employment the following letter:—

Cunard Line British and Foreign Steam Packet Company,
8, Water Street, Liverpool,

22nd March, 1876.

Captain ———

Annexed is a letter addressed to the surgeon of your ship. You will at once perceive the importance of being assured of the capability of your look-outs, especially at nights: and besides taking the opinion of a surgeon upon the question, you will kindly impress upon your officers that grave responsibility rests with them in their selection of men for a duty which is of paramount importance.—Yours truly,

D. & C. MacIver.

The accompanying letter to the surgeons was as follows:—

Dear Sir—As it is of the greatest importance that a thoroughly efficient look-out should be always kept, we have to request that upon the day of muster you will kindly pay particular attention to the eyesight of the men who are told off as look-outs, so as to ascertain whether those men have sufficiently good vision to enable them to see with natural acuteness, both by daylight and in the evening, and also readily to distinguish the colours of the different lights displayed by ships at night, so that they may report quickly and accurately, and may otherwise fulfill the duties of a thoroughly efficient look-out. In the event of your having any doubt as to the possession of the necessary qualification by any of the men, you will please to report your opinion to the captain, so that these men may not be employed upon a duty for which, in the exercise of your professional discretion, you consider them unfit.—Yours truly,

D. & C. MacIver.

These letters seem to me to have done the Cunard Company great credit, and I cannot help ascribing to the care they exercised in this matter much of the immunity from disaster which enabled them for many years to make their proud boast that they had never lost the life of a passenger.

But so little public attention had been paid to this question of eyesight that in 1875, although the slowing of H.M.S. Vanguard, which led to her being rammed and sunk by H.M.S. Iron Duke, was directly due to the report of a partially blind "look-out" man that a ship, which never existed except in this man's disordered vision, was crossing the bows, not one single comment was made on the dangers of employing defective. sighted sailors. The real cause of the disaster was neglected, six imaginary causes were found.

Dr. Caldwell, besides calling the attention of his employers to this matter, made it a point to seek an interview with Mr. Thomas Gray, then the Assistant Secretary to the Marine Department of the Board of Trade on the subject of colour blindness, night blindnes, and defective sight generally. Following upon this, the Board of Trade, in the year 1877, for the first time issued rules and regulations dealing with this question. In 1890, the Government, in response to public opinion expressed in Parliament and through the Press, handed the matter over to a committee appointed by the Royal Society.

On September 1st, 1894, the Board of Trade issued fresh tests as to form vision and colour vision to be applied to masters and mates in the Mercantile Marine. If carried out by competent medical examiners this standard of tests would be sufficiently good; but if the object in view is the attainment of perfect safety, so far as human foresight can ensure it for the seatraveling public, it contains a fatal flaw. This consists in the fact that the eyesight and colour-blind tests become compulsory only when a man enters for a second mate's certificate, instead of, as they ought to be, at the threshold of the sailor's career. The evils arising from this non-compulsion seems to me to be—(1) Colour-blind and defective-sighted boys are being brought up on training vessels for a profession for which they are physically and morally unfitted; (2) colour-blind and defective-sighted boys are being apprenticed for four or five years to the Mercantile Marine Service; (3) colour-blind and defective-sighted men are entering the Mercantile Marine as cabin boys and deck hands; (4) colour-blind and defective-sighted officers with endorsed certificates are to-day sailing the seas in charge of vessels; and (5) colour-blind and defective-sighted men become pilots. The consequences of the present condition of things are that while there is no real safeguard, the hardships inflicted upon these colour-blind and defective-sighted men who enter for a second-mate's certificate with the laudable desire of rising in the sea service is enormous, seeing that after years of hard work and drudgery, these men, who are often well educated and gentlemanly, are debarred from rising from the hard life of a man before the mast, which they are compelled to follow with no more ambitious prospect in life, or to seek some other employment for which they spend many more years in qualifying themselves. And here let me mention that there are special difficulties in the path of young men of this class abandoning a seafaring life and entering a new field of industry. Let me quote as a recent case in point that of a young man who had been at sea for eight years, and who had been rejected from defective sight on applying for his second mate's certificate, and who was glad to accept employment as a cotton porter at 27s per week. Even this remuneration is only nominal because the employment was not constant, and he would willingly accept 20s per week with a permanent situation. Another young man, who was found to be colour-blind, told me that after having done his best for three weeks to obtain a situation ashore, and utterly failing, he got employment last week on a well-known passenger steamer. A very painful case which came under my notice was that of a young man of high promise who, having been educated on the training ship "Conway," entered the service of a well-known Liverpool shipping firm, in which he behaved with such conspiciuous gallantry in a high storm at sea that he received special commendation from the First Lord of the Admiralty and the bronze medal awarded in such cases. On his eyesight being afterwards tested he was found to be colour-blind, and the brilliant prospects which he and his friends naturally entertained as to his career in life were cruelly dispelled, from a cause over which he had no control. These are only isolated instances out of hundreds which might be cited, of the evils and hardships arising from the absence of compulsory measures.

But if it is a hardship to a man whose defective vision is found out after a few years employment at sea, what is to be said of it in the case of officers who, after having been passed by the Board of Trade as colour-perfect, are now, on the institution of further tests, found to be colour-blind, with the result of being at once deprived of the highest and most responsible and lucrative positions in the Mercantile Marine Service? Such a deprivation, it can readily be understood, means in most cases not only the sudden collapse of ambition in life, but ruin and sometimes starvation to themselves and families. The case of a seaman named John Smith will serve for illustration. Having been twenty years at sea and having successfully passed in turn the examinations for second mate, first mate, and captain, under some of the best shipping companies, he found himself at the age of thirty-three, under the necessity of being re-tested at the instance of his employer, whose activity in this direction had been aroused by public attention being so much attracted to the subject. The result was that the officer was declared to be colour blind and that he could no longer hold his position. Though he had previously hardly ever suffered a day's illness, his dismissal so preyed upon his mind that he died shortly afterwards. Another case which might be cited is that of a gentleman aged forty, who had spent twenty-six and a half years of his life at sea and who, in the service of some of the leading steamship companies in England, had used to be first officer. Owing to the discovery of colour-blindness in his vision on his employer insisting on a re-examination, he was immediately reduced from a position of affluence,on one of the finest passenger steamers sailing out of the port of Liverpool, to a condition of penury. The best shipowners do in such cases provide shore duty of some kind which, though not nearly so lucrative as that from which they had been deposed, is likely to be much better than a discharged seaman usually finds for himself in the open market. In this case the firm found such an opening for him, but it was only after an interval of two years, during which the best employment the man could find was in the service of a Prudential Insurance Company, where, for a pittance of 18s a week, he had to perform daily journeys of twenty miles as a collector.

And now coming to the consideration of the remedies one naturally asks, "How is this objectionable state of affairs to be rectified?" The remedies I would propose are as fellow:—

(1) No boy nor man should be allowed to enter the mercantile marine service till his form vision and colour vision have been adequately tested and proved to be sufficient. This involves little or no difficulty. Every boy on being apprenticed to the sea has to obtain an indenture paper from the Board of Trade Office. Before obtaining this paper, his sight should be made the subject of a careful test, in which case discovery of colour-blindness would arrest, at the proper time in their advances towards a sea-faring life, most of the class who usually develop into officers of the mercantile marine.

(2) Every navigating sailor on going to sea is compelled by law to "sign on"—*i.e.*, to sign articles at the Board of Trade Office. Before allowing the seaman to sign, the shipping clerk should ask for his certificate as to eyesight. To do this would entail no difficulty, since every sailor is required to keep his discharges carefully and show them each time he signs on. To add another to his stock of certificates would, therefore, cause him no additional trouble, and were these two suggestions consistently carried out a colour-blind

sailor would be as rare as he is now common and readily found.

(3) Colour-blindness and defective vision in apprentices already bound by indentures should be in itself a reason for breaking the engagement. The necessity for this will be obvious when it is known that an apprentice of two years' standing can sometimes do the work of an able seaman though he receives perhaps only one-seventh of the pay, and that it is therefore to the interest of an unscrupulous shipowner to retain his services.

(4) Officers who at present hold endorsed certificates and whose names are of necessity known to the Board of Trade, should, as occasion offers, be given shore employment in the Board of Trade Offices; for though some of the better Companies find employment for those they depose on account of colour-blindness, there is a still larger number of cases where no such consideration is extended to them, and where dismissal is necessarily followed by the greatest hardship, and often by absolute ruin.

(5) The method of testing for colour-blindness or any defect in vision must be improved:—

(*a*) By being done by competent medical examiners.

(*b*) In a room specially set apart for this purpose, and fitted with artificial light of a standard which would supply equal illuminating power all the year round and obviate the varying and unsatisfactory results of tests, applied at one time in the strongest light at midsummer, and perhaps another during the fogs of midwinter.

(*c*) This testing room should be open daily in large seaport towns.

In drawing to a close I would like to emphasize the fact that, taking the hundreds of officers in whom colour-blindness has been detected by the Board of Trade, there is absolutely no guarantee whatever, that every man of them is not at the present moment doing duty at sea. In this connection I feel constrained to state openly that the apathy displayed by the Board of Trade throughout the long controversy which has existed between it and the medical profession since the year 1855, has been most deplorable and discreditable to it. Instead of having the best interests of these poor fellows at heart, it has thrown every possible obstacle in the way of reform, and only when Dr. Farquharson called the attention of the House of Commons to the questions in 1890, did the Board make a move from their do-nothing policy. The Board cannot plead ignorance, for the fallacy of their tests and regulations have been pointed out time after time, and notably by Mr. Brudwell Carter, and now, instead of placing the matter on a right footing, it is being tinkered with. The present tests and regulations do not arrest colour-blind boys at their entrance to the sea life, and they do permit colour-blind sailors, even when detected, to continue the sea life, and even take complete charge of vessels. But no condemnation of mine can equal the condemnation passed upon the Board's policy by their own representatives. For the first time in the history of the Board of Trade enquiries, the representatives of the Board of Trade did take, in February last, official notice of the condition of affairs to which I have frequently called attention, and which amounted to little less than a public scandal. In concluding their report upon the stranding of the S.S. "Violet," they said, 'There is one circumstance to which this Court wishes particularly to call attention. After the close of the enquiry, and the respective certificates had been given up in the usual way, it was subsequently found that the mate's certificate bore in red ink the memorandum—'This officer has failed to pass in the examination of colours,' signed by J. Clark Hall, Register General.' On the face of it, and without some explanation, it seems a most undesirable and reprehensible thing that a master's certificate should be granted to a man who is apparently unable properly to distinguish colours. The danger of entrusting the command to such a man is too obvious to need further comment. And assuming that a correct register of certificates granted be kept, then the Board of Trade's solicitor, conducting the enquiry, should have been instructed on the point in order that he might bring to the notice of the Court the fact, as under certain circumstances it might have had an important bearing upon the subject of the investigation.—Signed, Wm. M. Angus, James E. Woods (Justice), A. Anderson, E. Brooks (Assessors). Such condemnation of the Board of Trade is, I think, well warranted, and well deserved.

In conclusion, it only remains for me to quote from a letter to myself from Mr. T. H. Ismay, of the White Star Line, to show the opinion entertained on the subject by the head of one of the largest and most successful firms owning passenger steamers in the country. After apologizing for his inability to take part in the present interview, Mr. Ismay writes:—"I fully enter into and sympathise with the work that is being done, for I consider it of the utmost importance both for the Mercantile Marine and the railways, that colour-blindness should be eliminated and guarded against. In my connection with the training ship Indefatigable, instances of colour-blindness have come under my notice, and it is most desirable that cases like these should be discussed before the lads are sent to sea. I shall watch with much interest for the result of the interview with the President, and wishing every success to the good work which has been undertaken.—I am, Yours faithfully,

(Signed) Thomas H. Ismay."

A CASE PRESENTING INCOMPLETE REFLEX IRIDOPLEGIA IN THE RIGHT EYE AND INCOMPLETE ACCOMMODATIVE IRIDOPLEGIA IN THE LEFT EYE.

WENDELL REBER, M.D., Philadelphia, Pa.

Formerly Clinical Assistant Will's Eye Hospital, Philadelphia. Also in the Eye Departments of the Presbyterian and the St. Agnes Hospitals.

Four years ago, I observed an anomaly in pupillary reaction that has not, as yet, appeared in ophthalmic literature. *History.* H. a medical student, æt. 25, noticed long since that sometimes his pupils differed in size; at times one and again the other being the larger. There are no evidences of syphilis or of any cerebral or spinal disorder. The family physician is said to have remarked upon the pupillary inequality some years ago.

Visual acuity as follows:

O. D.—1.00⊂⊃—0.75 Cy. Ax. 180°=5-6.
p.p. with Cyl. only, 9 c.m.
O. S.—1.50=5-12,
p.p. without glass=9 c.m.

Accommodation therefore was normal. The left eye had always been the weaker eye. Ocular movements normal.

Pupillary reaction:

In bright daylight the right pupil was larger; it reacted but faintly to light, (alternate exposure and cover of both eyes). No difference between direct and consensual reaction, if I remember rightly; I have recorded no particular observation on this point.

On the part of the left eye, the direct as well as consensual reaction to light was prompt and energetic. The latter was wider in the dark than the right pupil.

In convergence accommodation the left pupil narrowed a mere trifle, while the right one (which was but faintly mobile to light) contracted promptly and fully. The width of the right pupil was influenced only by convergence or accommodation. If the right pupil was fixed at a certain width by convergence on a stated point, the left pupil (which was influenced only by light) could be brought to an equal width by carefully increasing or diminishing the illumination; conversely, if the left pupil was subjected to a certain illumination, thus fixing its area temporarily, the right pupil could be made to correspond in area by simply inducing convergence on a certain point.

Unfortunately, Mr. H. disappeared from observation, and I could not pursue the subject further. It would have been interesting to establish the exact quantitive relations between the the pupils, and further to note whether in the left eye there was perhaps present a hemianopic reaction. If, on illuminating the right half of the retina of the left eye, the pupil had remained wider than when the left half was illuminated. the Reflex Iridoplegia of the right eye could have been viewed as the result of a disturbance of all the fibres leading from the right sphincter nucleus (including the central inter-nuclear fibres) with the exception of the fibres of the accommodation nucleus; in which case another focus of disturbance between the left sphincter and accomodation nucleus must be granted to account for the left sided accomodative iridoplegia.

It would seem simpler to assume with Haddacus,[1] that the Iris branch of the oculo-motor nerve arises from two roots, one from the sphincter nucleus, and one from the accommodation nucleus. In our case therefore (provided there was hemianopic reaction of the left pupil), we would have to suppose deficient development of tne right sphincter nucleus; or with a normally acting left pupil, we must assume a disturbance of the root from the right sphincter nucleus, and also an affection of the root from the left accommodation nucleus. If the hemianopic reaction on the part of the left pupil be absent, the unilateral reflex iridoplegia of the right eye is hardly explainable except on the hypothesis of Haddeus,[2] referring to the two fold root origin of the iris branch of the oculomotorius.

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[1] Arch. of Ophth. Vol. xviii. p. i.

This conception lends itself readily to the idea of a congenital anomaly in our case, inasmuch as pupillary inequality had been noted for many years without the occurence at any time of whatsoever nervous affection. It would seem that if isolated eye muscles with their accompanying nerves can fail of development, so also can it perhaps occur that the right sphincter nucleus and the left accommodation nucleus (or the right sphincter nucleus alone) be deficiently developed.

Among the published histories of unilateral reflex iridoplegia (not manifesting the hemianopic reaction) that of Seggel has a resemblance to my own. In his case, however, the iris phenomenon was preceded by external ophthalmoplegia. The left pupil was not responsive to light but showed marked accommodative reaction, and in bright daylight was as narrow during convergence as the right one.

In bright daylight with convergence set aside, the left pupil was somewhat wider, while in the dark under the same conditions they were equal. During convergence in the dark the left pupil was narrower. A slight enfeeblement of the accommodative reaction of the right pupil would explain the phenomenon. Seggel's case would then be essentially the same in its symptom grouping as our own, only that in his case the conditions of the pupils were just exactly reversed.

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[2] Taken from Perlia's scheme of the eye muscles and their nuclei. (Arch. f. Ophth. Germ. Edition. Vol. XXXV. 4.)

THE BEST METHOD FOR MEASURING HETEROPHORIA: WITH AN INSTRUMENT TO FACILITATE THE MEASUREMENT.

By C. E. NORTON, M.D., Lewiston, Maine
Ophthalmic Surgeon to the Central Maine General Hospital, Lewiston, Maine.

As is well-known, there is in heterophoria a tendency to deviation of the visual lines along the horizontal plane, or at some angle with it.

In exophoria this deviation is outward in the horizontal plane; in esophoria, it is inward in this plane, and in hyperphoria it is at an angle of 90 degrees from this plane. In those cases where two forms of heterophoria exist, the deviation is at some angle less than 90 degrees from the horizontal plane.

The method heretofore pursued in measuring any compound heterophoria, as for example, hyper exophoria, was to measure the deviation in the horizontal plane, and then in a vertical line above this plane. In other words the angular length of the cosine and sine of the angle of deviation were measured.

If we wish to find out the exact angle of deviation, we could do so only by mathematical calculation, or by consulting a table where the problem had been previously worked out.

The above method of measurement seems more or less clumsy and inconvenient.

It would be somewhat similar to measure the position of the axes of cylinders for the correction of astigmatism, by measuring the sine of the angle above or below the horizontal line.

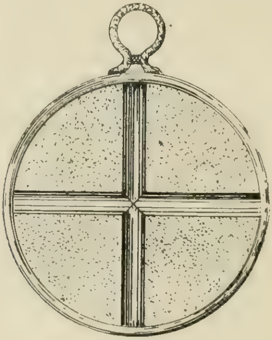
It seems desirable to find out the angle of deviation above the horizontal plane, and to measure the heterophoria along this line. In other words, instead of measuring the base and perpendicular of a right angle triangle to find out the length of the hypothenuse and angle at the base, it is desirable to measure the angle at the base and the length of the hypothenuse.

An important reason for ascertaining this angle of deviation is that we may give muscular exercise along this line by means of prisms.

It is evident that if an eye deviates in a certain direction, the muscles which move it in the opposite direction are relatively weak, and these are the muscles that should be strengthened by exercise with prisms.

I find by the records of the cases which I have examined for heterophoria during the past year, that about 64% had a compound heterophoria; that is, there was a deviation at an angle from the horizontal plane, of less than a right angle.

Now, it is manifestly improper to treat cases of this kind with prisms acting in either the horizontal or vertical plane alone, but the prisms should be placed so as to act directly in the line of deviation if we hope to attain perfect ocular balance



This plan of treatment I have pursued for several months in my practice with considerable success. But I have labored under difficulty in ascertaining the angle and amount of the deviation. This has induced me to invent an instrument, which I will now describe. It consists of a disk of glass having two polished semi-cylindrical grooves ground across it at right angles to each other. The disk is mounted in the usual frame of trial lenses.

On looking through the disk at the junction of these grooves toward a small point of light, two lines of light are seen crossing each other at right angles, each line similar to the one seen through a Maddox rod.

In practice, this disk is placed, with one groove horizontal the other perpendicular, in the right ring of the trial frame, the Risley phorometer or other similar instrument, and a disk of red glass placed in the other ring. On looking through these disks, the patient will see the bright cross with the right eye, and the red spot with the left eye. If the red spot appears to be at the intersection of the lines, there is orthophoria. If the spot appears to be on neither of the lines, the disk should be rotated until the line nearest the red spot appears to pass through the spot. The angle of this rotation can be read off on the frame. This shows the angle of deviation.

Now it is necessary only to measure the distance from the intersection of the lines to the middle of the red spot. This can be readily done by the use of prisms placed over the left eye with their bases elevated above or depressed below the horizontal line to the same degree that the right disk has been rotated. The deviating power of the prism required to bring the red spot to the intersection of the lines, will indicate the amount of right or left hyper-exophoria or hyper-esophoria.

This measurement can be more easily accomplished by means of Jackson's or Risley's prism-mobile, placing either instrument so it will act in the same direction as indicated above, and rotating the prisms until the bright spot appears to be at the intersection of the lines. The amount of deviation can then be read off directly from the scale.

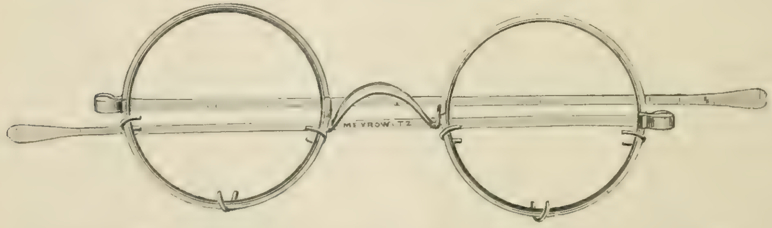
I am indebted to McIntire, Ulmer & Co., 127 South 8th, Street, Philadelphia, Pa., for carrying out my ideas in the construction of the instrument.

A NEW SET OF TRIAL FRAMES.

By WILLIAM E. BAXTER, M D., Bangor, Maine.

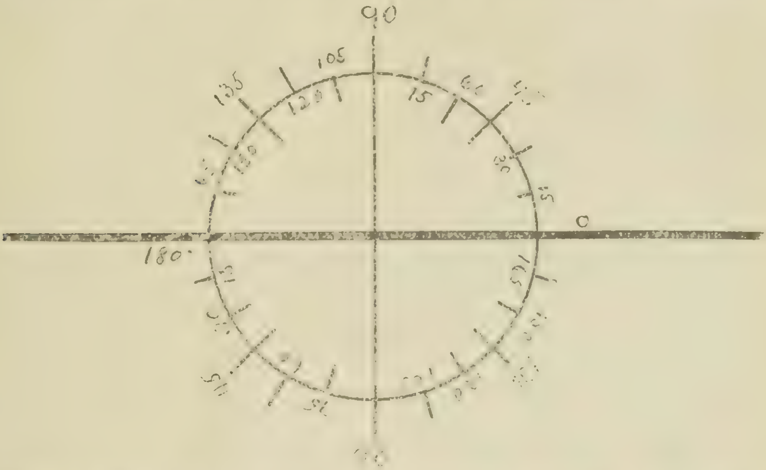
Surgeon to the Easton Maine Eye and Ear Infirmary. Ophthalmic and Aural Surgeon to the Bangor Genral Hospital, to the Home for Aged Women, and to the Children's Home.

That there is no perfect trial frame on the market is evident from the fact that the opticians advertise large varieties of these frames, and that new patterns are constantly appearing on the market. In the January number of the Annals of Ophthalmology and Otology, 1894, Dr. Prince mentions a light wire trial frame used by Dr. Jackson, of Philadelphia. I have used these frames for some time with so much satisfaction, that I trust that a discription of them may be of interest. The lens carrier consists of a piece of light wire bent in the form of a circle to which are attached three double hooked projections adapting it to the support of two lenses before each eye, the nose piece and temples are also of wire, and the whole frame weighs less than a quarter of an ounce; there is space, when two lenses are before one eye, to slip the cover glass between lenses, so avoiding the trouble of removing one glass to make room for the cover glass, while fitting the other eye in cases requiring more than one glass in the frames. A set of from four to eight of these frames may be had of different interpupillary distances, and of various height and depth of nose-pieces, these frames are also of great value in obtaining the correct



measurements in ordering spectacle frames, taking the place of the sets of sample frames furnished by the opticians. By useing the cylindric lenses with the axis set at an angle of forty-five degrees to the handle, as I suppose is the habit of most practitioners who have much refraction work to do, all of the angles from 0 to 180 may be obtained by turning one side or the other of the lens out.

The axis of the cylindric lenses may be obtained by the axis-indicator of Dr. Prince, or by means of a simple protractor like the following, draw a circle of about six centimeters diameter,



with a long line through its horizontal diameter, the upper semi-circle is graduated from the right to the left, and the lower from the left to the right, the paper with this drawing is pinned in the cover of the trial case, and when the correct axis is found, the trial frame is removed from the face, the frame held over and parallel to the horizontal line, the center of the lens held in front of the center of the circle and the angle of the axis read off from the circle. As these frames cost only one dollar each, a complete set will not cost more than one of the elaborate trial frames on the market. These frames can be obtained of Meyrowitz, New York City.

Eighth International Congress Of Ophthalmology.

In this issue we complete Dr. Hubbell's report of the Edinburgh Congress. So far as we have been able to observe, this report by Dr. Hubbell suppasses any other report yet published. While it has occupied a good many pages in consecutive issues of the RECORD it has not been too long. We again thank Dr. Hubbell for having thus favored us.

San Francisco Meeting of The American Medical Association.

In this issue we continue the publication of papers in abstract and discussions in full as they were presented in the Section of Ophthalmology at San Francisco. In the next issue we will complete the publication of the report of that meeting. Taken as a whole the work done by the Section last year has shown up well.

The Baltimore Meeting of the American Medical Association.

This meeting was largely attended and much scientific work was accomplished. The program for the Section of Ophthalmology was never longer, nor was the Section ever more largely attended. A few who had promised papers were absent, but every author who was present read his paper before the Section. The length of the program necessitated the adoption of a resolution that the reading of a paper should occupy only ten minutes, and there should be no extention of time in any case; the same resolution limited the discussion on the part of each individual to five minutes. If this rule had not been adopted the program could not have been more than half finished during the four days session. The work done will compare favorably with that of any former meeting of the Section. Dr. Jackson, the Chairman, and Dr. Wurdemann, the Secretary, of the Section deserve much credit for the success of the meeting. In the next issue we will have more to say about the Baltimore meeting.

Dr. Lucien Howe was elected Chairman, and Dr. Frank Allport Secretary, of the Section of Ophthalmology for the Atlanta meeting, next year. Within a few minutes after their election they commenced the work of securing promises of papers. There can be no doubt but that these officials will succeed in making the meeting of the Section at Atlanta one to be long remembered because of the scientific results accomplished.

THE
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A CASE OF CHOKED DISKS, THE RESULT OF CHRONIC CEREBRAL MENINGITIS, WITH AUTOPSY.

By DAVID WEBSTER, M.D., of New York.
Professor of Ophthalmology in the New York Polyclinic and in Dartmouth College;
Surgeon to the Manhattan Eye and Ear Hospital.

R. J. S., aged 28, bachelor, plumber and gas-fitter, resident of New York, consulted me September 29th, 1883. He gave a history of malaria with chills and fever which "hung around him" for over a year, and which left him about the time his sight began to fail. His sight failed gradually, and he could see to read up to ten months ago. His mother had noticed a peculiarity in his walk for the last three months. He had a severe headache two days ago, but is not subject to headaches. He has had a great deal of dizziness. He never had venereal disease, and never was in the habit of drinking alcoholic stimulants. He has used tobacco moderately for twelve years, by smoking and chewing. Now, he does not chew at all, and smokes only two pipes a day.

Soon after he began to lose his sight, his family physician sent him across the ocean. He consulted Mr. Nettleship, in London, who made a diagnosis of optic neuritis from lead poisoning, and put him upon iodide of potassium.

Vission $\frac{20}{200}$, each eye, not improved by glasses.

OPHTHALMOSCOPIC EXAMINATION: Choked disks. Disks swollen to $\frac{1}{12}$ or more, a "woolly" looking exudation obscuring the discal margins and extending about a disk's diameter into the retina; arteries almost nothing; veins somewhat dilated; no retinal hemorrhages. His urine was examined by Dr. E. A. Maxwell, and kidney disease excluded. I was inclined to a diagnosis of intracranal tumor, and put him upon mercurial inunction.

October 2nd. By artificial light, vision $\frac{20}{100}$, each eye. He is color blind, calling green red, red magenta, blue yellow, etc.

An undated letter from his mother, received, I think, about two weeks later, describes his condition as follows:

"He was complaining of sore mouth and gums yesterday. I washed off the ointment. His face and head looked so much enlarged last night, and all day he was very quiet and would not converse at all. This morning, at four o'clock, he commenced reaching and vomiting. First, it looked like green water, afterwards, yellow, but so offensive that I could hardly bear to stand by him, and his head all enlarged and aching more after the reaching. He says it must split open."

November 3rd. The patient had no attacks of vomiting since that referred to in the above letter. He no longer complains of headache or dizziness.

Soon after the visit last noted, the patient went to New Jersey to live, and I saw him no more. The remaining portion of his history was communicated to me by a physician who omitted his signature, and whose name I have in vain endeavored to recall. His statement which I append is none the less interesting and valuable, however, as it completes the the history and furnishes us with the *true diagnosis.*

"I was called, on February 15, 1884, to see Robert J. S., who had been blind for over a year, and who gave the following history: He was a native of England, Eleven years ago he was sun struck and confined to his bed for one week, and part of the time he was delirious. From that time to his death he complained of headaches. At times, in working at his business, on getting up suddenly, he would strike his head against beams. This always aggravated his headache. His head trouble gradually increased, and he noticed a gradual loss of sight, until he finally became totally blind. He placed himself under the care of an American physician, but was not benefitted. He went to England and consulted an Ophthalmologist of high standing, who pronounced his case one of optic neuritis, caused in all probability by lead poisoning. He returned to this country and consulted Drs. Agnew and Webster.

"He came under my care in the latter part of February, and presented the following symptoms: Total blindness, inability to walk, or even to stand without assistance, frequent and intense headaches, and a sense of great fullness in the head. His urine was scanty, high colored, and at times albuminous. His efforts at micturition consumed from ten to thirty minutes. His bowels, as a rule, were constipated. When first seen, and for some time afterwards, he was unable to carry on conversation, and when questions were addressed to him, he replied in monosyllables. On account of his blindness and loss of power of locomotion, I diagnosticated his case as one of chronic cerebral meningitis with pressure on, or inflammation of, the spinal cord. The treatment consisted of counter-irritation by cantharidal collodion applied to the back of the neck and sides of the spinal column as far down as the sacrum. Under the impression that there was an exudation of serum and lymph, I prescribed potassium iodide, and bichloride of mercury, but learning that he had been ptyalized without benefit, I abandoned the mercury and put him on increasing doses of potassium iodide. This was continued some time, when syrup of hydriodic acid (Gardner's) was substituted with apparent benefit. The galvanic battery was used, placing the positive pole on the back of the neck and passing the negative pole up and down the spine. For his partial paralysis of the bladder, I applied the positive pole of the galvanic battery along the spine, especially over the lumbar and lower dorsal regions, while the negative pole was applied over the vesical region, with the happy result of a complete disappearance of the paralysis. Strychnia was given to increase muscular tone. His symptoms gradually improved, and during the latter part of June he walked about four or five miles at a time. He experienced flashes of light and at times could distinguish his mother's face, trees, houses, animals, etc

"I saw him for the last time on July 16th, and was informed of his demise on the 25th of the same month. Two days before his death he was seized with a violent headache, nausea, and vomiting, followed by convulsions, coma, and death. The autopsy was held on the 26th, the day after his death, in the presence of three other physicians.

"*Autopsy.* Body well nourished, rigor mortis well marked, calvarium normal. There were several points of lymph in the vertex of the dura mater, no clot in longitudinal sinus, the convolutions were flattened from pressure within, and the surface of the brain was smooth. Beneath the points of exudation the dura mater was adherent and for a small space around On removing the brain, the pituitary body was torn off, and through a small opening thus made, serum poured out as from a fountain. On opening the ventricles they were found much distended by a large amount of very clear serum, estimated at from eight to ten fluid ounces. The lesions found satisfactorily account for all his symptoms, and mode of death. At the request of the family, no further examination of the body was made."

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY OF THE A.M.A., SAN FRANCISCO MEETING, 1894.

Papers in abstract, discussions in full.

SUB-CONJUNCTIVAL INJECTIONS IN THE TREATMENT OF EYE DISEASES.

By WM. ELLERY BRIGGS, M.D., Sacramento, Cal.

"*Subconjunctival Injections in Ocular Therapeutics.*—During the past four years Drs. Darier and Abadie, two very progressive Paris oculists, have been extensively using sub-conjunctival injections of mercuric chlorid solution in the treatment of many eye disaeses. As I watched their work in their large clinic, during the experimental stage of the method, I saw it tried in many diseases in which there was obviously little or no hope of benefit to be derived from any treatment. But from my observations I became convinced that good results were obtained in a certain class of cases. Since that time I have treated quite a number of cases by the method and have been led to the conclusion that many of them had done better than they would under other treatment alone.

"Most of the cases under my care have been of septic or syphilitic origin, so other treatments had been used in conjunction with the sub-conjunctival injections. * * * * *

"My conclusions may not be shared by many, but I believe that this method of treatment is a real advance and will establish a permanent place in ocular therapeutics. In Germany as well as in France a number of prominent oculists have reported very favorable results from the method, but I have been surprised that so little attention has been paid to it in this country. * * * * * * * *

"Dr. Darier injects two to five drops of a 1 to 1,000 sublimate solution beneath the conjunctiva and not nearer than seven millimeters to the corneal border. If the injection is made too near the cornea the pain is likely to be severe. Care should be taken not to puncture a conjunctiva vessel or unpleasant ecchymosis will follow. In case this does unavoidably occur it will soon disappear under applications of hot water. The conjunctiva should be thoroughly anesthetized by cocain previous to treatment. It is hardly necessary to mention that the solutions and instruments used should be perfectly sterilized.

"In my practice I have generally employed three to five drops of a 1 to 2,000 bichlorid solution. The frequency of the injections should be regulated by the urgency of the case and the severity of the reaction. In a few cases they can be made daily for a few times, but in most cases not oftener than two or three times a week. Immediately after the injection a little bleb appears at the point the fluid enters. Frequently sharp pains are experienced for a couple of hours after the injections. This can be mostly relieved by cocain drops and hot or cold water. The position of the injection should vary to prevent excessive irritation—a point covered by one of the lids is most favorable.

"In years past patients suffering from local inflammations of septic origin were given mercury internally to counteract the septic process. I have no doubt that by administering bichlorid solution sub conjunctivally, in septic ocular disease, the same end can be attained with greater certainty and rapidity than by means of general medication. In nearly all cases the sub-conjunctival injection should be supplemented by other treatment appropriate to the case. The constitutional treatment is of the utmost importance in most affections of the uveal tract. The injections are frequently of the greatest benefit on account of the promptness by which the mercury can be made to reach the disease process. But the constitutional treatment is of quite as much importance in order to eradicate the constitutional disease upon which the local affection depends. * * *

"The cases in which I have found the method of treatment to do the most good are syphilitic diseases of the choroid and septic ulcers of the cornea. It seems usually to exert a salutary influence on most syphilitic processes of the uveal tract except in the acute stage of iritis. In some subacute, and late stages of acute, iritis I have had prompt improvement from the administration. It often seems to help in a marked manner cases of choroiditis of rheumatic origin, and in recent vitreous opacities from syphilitic retinitis good results may be expected. * * *

"Dr. Darier has laid down this rule, that in case improvement is not manifest by the tenth injection that we need not expect good from the method. This conforms to my experience, as we generally get perceptible improvement in from four to ten injections."

DISCUSSION.

THE CHAIRMAN—The method has not commended itself very strongly to my judgment and I have been slow about adopting it, but have noted this one interesting fact that it seemed very promptly to relieve pain especially in cases of keratitis, where pain has been very severe. I think that has been noted by every observer. It is a striking fact and one that seems rather anomalous that such effect should be produced without any apparent effect on the course of the disease.

DR PISCHL—I wish to say that I tried it only in one case but the patient was so frightened by the swelling that I did not venture to continue it, and I am afraid that many patients will revolt against the injection.

DR. BRIGGS—Mr. Chairman, I have nothing particular to add· I am sorry that there is no more discussion on the subject. I think if Dr. Pischl tries it in cases of keratitis or some such trouble, he will continue to use it. My experience has been in certain cases quite favorable, and I am thoroughly convinced in my own mind, that it acted very beneficially in quite a number of cases. A number that I have tried it in found no benefit, but I have not found the severe reaction that Dr. Pischl mentioned, and I have no patients who revolted or objected seriously to the treatment.

PURULENT OPHTHALMIA AND ITS TREATMENT.

By X. C. SCOTT, M. D., of Cleveland, Ohio.

In speaking of purulent ophthalmia I embrace under the one name all forms of this disease as described in most text-books, under the name of purulent ophthalmia, gonorrheal ophthalmia and ophthalmia neonatorum. It has always been a mystery to me why authors persist in making this unnecessary division, unless it is to mystify the general practitioner or increase the number of pages in their books. It seems much more simple to designate all three forms of this disease under simply purulent ophthalmia or conjunctivitis blennorrhea, for the parts involved are the conjunctiva and subconjunctiva, with a serous effusion into their tissues and also into the stroma of the lids. The only difference that can be found is the presence of the gonococcus of Neisser in cases of gonorrhea, but these gonococci are not always present, and even their presence, I am unwilling to admit, renders the disease more dangerous if properly treated. Every one agrees that purulent conjunctivitis in any form is one of the most serious and dangerous diseases of the eye. I shared this opinion in common with others until within a few years, when I adopted a plan of treatment which has robbed this disease of all its terrors, whether it occurs in infancy, childhood or adult life, provided the cornea has not become dangerously complicated.

These cases have been cured within a week or ten days in every instance, instead of running, as the books say, a course of four or five weeks in the most favorable cases. It is not necessary for me to describe the ordinary course of a case of purulent ophthalmia, as you are all conversant with it. You well know the great source of danger is the corneal complication which may arise from the swollen chemotic condition of the conjunctiva, cutting off the blood supply for its necessary nutrition: 2, the swollen hot lids and the cornea being continually bathed with pus causes a continual fomentation of the corneal tissue, and thus favors ulceration and destruction of this membrane; 3, the corrosive effects of the pus itself.

The great question that concerns us is how can we overcome or prevent these three important, dangerous and injurious factors which have caused such terrible havoc with so many eyes of mankind? By what treatment, or what is the best treatment, to cause these cases to run a short course, and with a favorable ending, without injury to the cornea?

You cannot open any text-book but that you will find advocated, that in the formative stage of this disease, the conjunctival sac should be frequently cleansed of pus, at the same time using some imaginary antiseptic, but that it is extremely dangerous to apply any astringent remedies; that cold applications should be made continually to the lids until the conjunctival membrane becomes soft and succulent. This cleanliness and these cold applications are proper and certainly indicated, but in many cases if you wait until the conjunctiva becomes soft and succulent before making any applications to the surface of this membrane, changes will have taken place in the corneal tissue which can not be controlled and may finally end in the destruction of the eye affected.

Instead of a do-nothing and an expectant plan, in addition to trying to have perfect cleanliness and cold applications made continuously, I commence the use of the following prescription from the very beginning:

℞ Hydrastia sulphatis	grains 5		30
Acidi boraci	grains 5		30
Sodii biboratis	grains 5		30
Tinct. opii deodorat.	drachm ½	2	
Aquae distillata	ounce 1	32	

Mix and filter.

The attendant or nurse is instructed to cleanse the eyes every fifteen or twenty minutes day and night, by opening the lids and wiping away all the secretions possible; to make cold applications to lids by means of compresses which have laid on ice and from four to six times a day with a long nozzled dropper and hot water to wash out all the pus held in the conjunctival sac under the lids, and afterwards to inject up and into the conjunctival sac of both the upper and lower lids an ordinary medicine dropper full of the above prescription. The nozzle of the dropper should be long and smooth and of sufficient length that it may be easily introduced without breaking under the upper lid.

The above mentioned solution seems to have a most beneficial influence on all acutely inflamed mucous membranes where there is a secretion of pus. I have used it in cases of other acutely inflamed mucous membranes with the same benign results and effects that have been experienced in the mucous membrane of the eye. When this solution is properly used in cases of purulent ophthalmia, there will be a marked improvement in the case within twenty-four hours, and within forty-eight hours there will be a remarkable diminution of the secretion of the pus, chemosis of the conjunctiva and swelling of the lids.

Once a day I turn the lids, and having cleansed away the pus, apply a 1 per cent. solution of nitrate of silver to the palpebral conjunctiva by means of a large camel's-hair brush. Now you may say that this is falling back on the old treatment, and that all the good comes from the employment of the silver salt. If this is true why did or do we not have the same benign results in the treatment of this disease from nitrate of silver, as it is the treatment recommended by all authorities as soon as the conjunctiva becomes succulent? I do not believe that the nitrate of silver has anything, to any great extent, to do with the aborting of the disease and the rapid diminution of the secretion of pus, but I use it for two reasons: 1, it is recommended by every author writing on this subject as the sovereign remedy to be relied on in the treatment of this disease, and if, perchance, by any mishap, an eye should be lost and a case of malpractice should result, the first question to be asked would be: "How did you treat this eye?" and when it was discovered that no nitrate of silver had been used, as recommended by all authorities, the hue and cry would be raised that gross malpractice had been done, and that the eye had been treated in a way not recommended by any authority, consequently there would be a possibility of being mulcted for damages by an intelligent American jury; 2, I want to see my patient every day, and if something different is not done at each visit from that which the nurse did, many families not understanding the importance and danger threatened, would think there was no necessity for the physician visiting the patient so frequently, if the nurse could make all the necessary applications of medicine. In this connection allow me to enter my most earnest protest against either strong solutions or the mitigated stick of nitrate of silver ever being used in any disease of the conjunctiva. It always does more harm than good, and in cases of purulent ophthalmia may be the cause of starting corneal complications, which it is our great object to avoid. In cases where you are not called until the disease is well formed and the conjunctiva and lids are so swollen and edematous that they can not be opened it is imperative that the outer canthus should be divided, and I would recommend that you go even a step farther than simple division and divide the ligament (if I may call it such) which holds or binds the upper lid to the outer margin of the orbit, so that all constriction is removed and thus free the cornea from this danger. The bulbar conjunctivæ should also be incised to favor the flow of the serum and thus lessen the chemotic condition. When the case is seen at the very start, and before the lids and conjunctiva have become greatly chemosed and swollen, the above mentioned local medical treatment will cause the disease to abort in from three to five days, often within two or three days. In cases where the disease is in full blast with the conjunctiva and lids swollen, with a large secretion of pus, unless the corneal membrane has become affected, all purulent discharge and swelling will disappear within a week. With this mode of treatment, as the disease abates, the conjunctiva presents an entirely different appearance from that which it presents under the ordinary manner of treatment, recommended in all our text-books. It becomes smooth and presents a normal appearance, like to what it was before the attack. Its mucous surface presents no velvety or villous appearance, with deep sulci between the swollen papillæ and folds of the membrane.

My experience and results with the treatment proposed have been so satisfactory that for several years past, when I have had a patient with one eye affected with purulent ophthalmia, I have not in any case taken the precaution to hermetically seal the well eye, nor have I in any case applied leeches, nor has the well eye become affected. The integument of the lids of the affected eye should be frequently dried and anointed with lanolin, or something similar, in order to prevent excoriations and irritation of their dermal surface.

By employing the treatment recommended in this paper you will find that, if sufficiently early employed, it will prevent chemosis of the conjunctiva and swelling of the lids if they have not already taken place. It will prevent the formation and secretion of pus, and avert dividing the outer commisure of the lids or incising the chemotic conjunctiva or applying leeches. In cases where the disease has reached the acme, with greatly chemosed conjunctiva, large quantities of pus secreted and swollen lids, if the cornea is still intact, I have never seen it become affected when this treatment has been followed; but on the other hand the chemosis of the conjunctiva, swelling of the lids and secretion of the pus have rapidly disappeared, leaving no impairment of the eye. In regard to the complication that may arise from the cornea becoming affected, it is only necessary to say that when this membrane does become affected the manner of management and treatment is sufficiently described in all ophthalmic text-books and it would be a waste of time to repeat them.

Since Von Graefe's time, and because he recommended it, every writer writing a text-book has extolled the virtues of chlorinated water in the various forms and stages of this disease. After a faithful trial of it, in many cases, it has proved extremely unsatisfactory in my hands.

There is no doubt that many cases of purulent ophthalmia in the new-born child can be prevented by proper washing and cleanliness of the parturient tract before birth, and proper washing of the infant's eyes, before washing any other part of the body. I am prepared to go farther than this and say that with the care above mentioned of the mother and child, and a drop of this yellow solution instilled into the infant's eye three or four times daily for the first three or four days of its life, that there would be no more cases of purulent ophthalmia in new-born children, and our blind asylums would be deprived of twenty-five per cent. of their inmates, thus bringing untold blessings and happiness to these poor unfortunate ones who pass their lives in darkness, a burden to themselves and their friends. You may think that I am too much of an enthusiast for this treatment, and that it is impossible to obtain such wonderful results. To those who doubt and question that such an effect and results can be obtained, I can only say try it on your cases of purulent opathalmia, and you will become as strong a believer and as enthusiastic as I am. You will feel like publishing it from the housetops as a blessing, and a prevention of misery to our fellow-men.

DISCUSSION.

Dr. H. V. Wurdemann, Milwaukee—The result of any method of treatment depends upon the stage of the disease in which the same is used and the condition of the tissues. I consider the cleansing method of treatment, with very weak solutions of corrosive sublimate or nitrate of silver, the most important. I can not conceive that in all cases it would be possible to obtain such flattering results as reported by Dr. Scott by any method of treatment. All cases may not be aborted as is evinced by the occurrence of ophthalmia in the hands of our most antiseptic accoucheurs. I call to mind several cases. I am inclined to take the middle ground, and while always endeavoring to protect myself in the family by explaining the fearful nature of the disease, I have never yet, in a comparatively large experience with this disease during the last few years, had a case go on to destruction, or injury of the cornea, where it has come into my hands at a sufficiently early date, before the ulceration of the cornea had ensued. Despite this, I do not forget the fact that cases have occurred and have been reportod by some of our foremost men, in which the child has been properly attended from the inception of the malady and yet has gone on to destruction. As has been noted, some of these patients are subjects of general cachexiæ, and such, as I have reason to note, are apt to prove intractable to any form of treatment. We should be a little careful in setting forth such rose-colored views of the question as have been advocated by the author of the paper, lest material injury be afforded some of us by the occurrence of one of these unfortunate cases. I, for one, can not say that I have ever seen a case "aborted" where the disease had so far advanced as to be recognized by the family or attending physician, and consultation called. Those of you having had experience in urethral therapeutics will agree with me when I say that after the first manifestations of gonorrhea have appeared, the disease is seldom or never aborted, although testimony to the contrary has been brought forward. Such is, however, not the general experience. The disease may be mitigated and its course shortened by treatment. I am pleased to see Dr. Scott makes no distinctions in purulent conjunctivitis of infancy; these are almost invariably gonorrheal in origin, and are to be treated upon the lines laid down for that disease. We can not do away with nitrate of silver, which, used after suppuration has been well established, is of marked benefit. This may be applied by the physician or a trained nurse. I am particular about instructions to the attendant as regards thorough cleansing away of the pus. I consider that no hard instruments, such as droppers or brushes, should be given into unskilled hands during the course of this disease, for the slightest abrasion of the cornea means infection of that structure and probably irreparable damage. Soft pads of absorbent cotton soaked in the solutions and the latter dropped into the eye for cleansing, and atropin, when necessary, in the form of an ointment, are the least dangerous ways of applying the necessary medicaments. All manipulations by the attendant should be done with the utmost gentleness and thoroughness.

DR. A. BARKAN, San Francisco—I regret that Dr. Scott does not substantiate his statements with proper statistics. As he still continues the application of nitrate of silver, many of us will go on and think that that remedy is the mainly curative one. We all know the excellent effects of nitrate of silver in blennorrhea neonatorum. Why should not the same remedy act beneficially in purulent ophthalmia in the adult?

DR. STARKEY—I fear that I must come under the number spoken of by Dr. Scott, just at the close of his paper, who are skeptical as to the uniformly good results obtainable by any means, but shall gladly follow his injunction and try his method and hope to be convinced. My experience has been such in these cases, both in the new-born and in adults, that I can not take a very rosy view of the prospects of recovery in any case of purulent ophthalmia that comes under my care. It seems to me that, as was said in this Section last year, the only time in which purulent ophthalmia can be treated with universal success is before the disease occurs; when infection has actually occured, it seems to me that a certain proportion of eyes will be lost by any treatment yet devised. Take a poorly nourished and perhaps premature infant with this disease—an infant that under any circumstances has all that he can possibly do to live—and the prognosis is exceedingly grave. We must all of us have seen such patients, with little discharge, easily controlled, also little swelling of the lids and little chemosis in which the cornea seemed to melt away from lack of nutrition. No pressure, no maceration with pus, and yet no nutrition. Now it seems to me that we should be very careful about asserting that all eyes with purulent ophthalmia can be preserved by this or that treatment. Such statements reach the public and may come up to confound us after we have had one of these unfortunate results.

DR. KASPAR PISCHL—May I call your attention to the publication of Prof. Burkhardt, of Berlin, who has a very extensive experience in purulent ophthalmia of young persons? He has discarded the application of ice and the use of strong solutions of nitrate of silver. He lays particular stress upon the removal of the gonococci from the conjunctival sac. For that purpose he instills into the inner corner of the eye, nitrate of silver 1 per cent. solution, and moves the lower lid rapidly up and down so that the fluid is thrown under the upper lid, and the cul-de-sac is thus thoroughly cleansed. This is repeated several times a day.

DR. J. D. ENNIS ARNOLD—The method of treating purulent ophthalmia, advanced by Dr. Scott, appears rather a step backward than a step in the advance; and yet I fancy we all feel inclined to make a trial of these medicaments, though the disease under consideration is one in which time lost in going after strange gods is likely to be fraught with dreadful consequences. The trend of modern treatment in all local disease is not the blind adoption of a fixed method, with increasing faith in the power of a medicament to correct or cure the disease, but rather the rational adoption of procedures that have for their object the removal of material which we believe to be causative factors in producing the disease. In purulent ophthalmia we dare not destroy the living bacteria present, nor dare we even use substances able to prevent their multiplication, *in situ*.

By frequent cleansing all *materies morbi* must be removed from the conjunctival sac, and by punctilious vigilance we must stand always ready to prevent impairment of function by forestallment of tissue destruction. To-day there would be little excuse for him who would allow a corneal ulcer to penetrate spontaneously the anterior chamber, or for him who failed to relieve by section the pressure that threatened to produce tissue necrosis. The Crede method with the eyes of new-born children, is not a treatment of purulent ophthalmia, but an attempt, and nearly always a successful attempt, to prevent purulent ophthalmia.

Dr. Scott, in closing—Gentlemen, I am not surprised at the remarks made about this treatment. It is simply because you have not had any experience with it. The books say it is generally four or five weeks in the most typical cases. I have not lost a single case with it, if I got the case sufficiently early. It is miraculous how quickly the discharge disappears. I do not get any of the indications of the ordinary treatment. The conjunctiva is comparatively smooth. If you will try it, every one of you, you will be just as much an advocate of it as I am. I have taken ordinary cases of pure ophthalmia in the new-born child, and in four days had them perfectly well. I do not believe the nitrate of silver has anything to do with it. I know this has been used in gonorrhea where in three or four days it stopped entirely. There is not a particle of pain in its application. In my own individual case I have used it. I had a very severe attack in my head, an immense secretion of matter from the head and nose. I tried everything to control it until I used this solution, and in two doses it disappeared. It seems to be antiseptic, to destroy the formation of pus, and to act beneficially upon the mucous membrane and secretion of pus. Try it thoroughly and you will be just as much an advocate of it as I am.

CONSERVATIVE TREATMENT OF WOUNDS OF THE EYE-BALL.

By LEWIS H. TAYLOR, M. D., Wilkes-Barre, Pa.

I do not propose to weary the members of the Section by attempting to discuss the subject of wounds of the eye-ball in all of the phases which that subject might present, nor will I even enumerate the varieties and grades of these injuries, but will confine my remarks briefly to a consideration of some of the more serious forms, such as penetrating and lacerated wounds involving the iris and lens.

Living as some of us do, either in mining or manufacturing districts, we are frequently confronted with eye injuries of all grades, from the small cinder lodged upon the cornea, which in its effects is often-times by no means small, to the severe laceration of cornea, lens, iris and sclera.

The important question that at once arises is, to what extent shall I interfere with this eye? and how far dare I trust to the recuperative powers of nature to bring about a good result? We are taught in some text-books that if the iris is prolapsed, at once excise it. If the wound is a penetrating one and into or near the ciliary body, enucleate the ball in order to save the other. I cannot in all cases agree with these teachings. I have had a number of serious injuries to deal with, in which the iris was involved in the wound and let alone with as good results, or better, than in similar cases where an effort was made to remove the adherent portion. It is difficult to remove the portion of the iris entangled in a bruised or lacerated wound, by iridectomy, and unless seen very early after the accident our patients will probably fare as well if the iris be left alone and allowed to heal over, fastened in the wound, as if we attempt its removal. I say, unless seen very early after the accident; I might say, if seen very early, the removal is not usually necessary, for it may often times be re-placed and freed from its entanglement in the wound.

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Dr. H. Knapp, of New York, at a meeting of the American Ophthalmological Society in 1893, in discussing his paper on "Traumatic Dislocation of the Iris," says: "Now something about prolapse of the iris in eyes that have been injured. This is an exceedingly important matter, and I have made it a rule not to touch a prolapsed iris unless I could get it entirely fresh. I have never seen sympathetic ophthalmia where there was prolapsed iris which had not been wounded by the injury or by the surgeon's knife. If cases come in the first four or five hours, where a clean iridectomy could be made and I am sure that the foreign body was not an infecting one, then I make an iridectomy. If they come some time afterward, I leave the prolapse alone for it is very difficult to get at the lateral portions which will be incarcerated in the corners of the wound, and if operated on they are more apt to be followed by sympathetic ophthalmia or purulent infiltration than if left alone."

* * * * * * * * *

Dr. Noyes says: "The danger consequent upon prolapsus iridis increases with its extent and its nearness to the ciliary body. Traumatic prolapse is more dangerous than anterior synechiæ resulting from inflammation and perforation. A wound through the limbus and extending into the ciliary region demands abscission of all tissues which present." My own experience, however, inclines me to conservatism, and I strongly believe that a large number of these cases will do as well or better if the iris be replaced so far as it can be and let alone, as if we attempt to remove it.

DISCUSSION.

Dr. Baker.—Mr. Chairman, I am firmly of the opinion that many of us have removed eyes that might have been preserved. While the dangers of losing both eyes from sympathetic inflammation are very serious, I do not think that we should, upon first seeing an eye and recognizing that there is a very serious injury, decide on enucleation. During the past two years I have had two cases which illustrated this matter very forcibly. First, a boy about 12 years of age who had gone to one of the rod mills in the city. The iron rods, as thick as your finger, come out of these mills and shoot very rapidly forty or fifty feet across the room. One of these rods struck this boy in the eye, making a large opening in the lower part of the cornea through the sclerotic, so large that your finger could be very easily passed through this opening. Almost one-half of the circumference of the globe seemed to be torn open; the vitreous was protruding. I immediately proposed enucleation of the eye. The parents refused. I then put in a few stitches and brought the wound back as well as possible. To my surprise it healed and there was not a particle of reaction from it. I used eserin instead of atropia. The case went on to uninterrupted recovery and though the field was contracted the vision was almost perfect, that is, he could read something like twenty or thirty feet, but the field of vision was contracted. I have watched this case since and have seen no bad results following.

A few months since a patient came to me for enucleation of the eye; he was engaged in ship building. A bolt had been knocked off and struck the lower lid, puncturing it and making a very large opening in the sclerotic, almost as large as in the boy's eye. It was one of those injuries in which it seemed as if the whole eye had escaped. The eye seemed almost collapsed. The patient was very anxious to save the eye if possible, and following the experience I had with this boy, I adopted the same line of treatment and used the eserine. This case ran along to almost uninterrupted recovery. I am certain that two or three times in my life I have removed eyes with similiar injuries while in these cases I have, so far, had no bad results. The same thing is true with regard to injuries of the cornea. If it does involve the ciliary region to any great extent, we can often save the eye where we are confident there is no foreign body and with the means we now have. In most of these penetrating wounds, in these large manufacturing centers, the foreign body is a piece of steel or iron and by the use of the magnet we can often exclude the foreign body in the eye. I think we should make an effort to preserve some of these eyes that formerly we should have removed.

DR. BRIGGS.—In my earlier experience I neglected eyes that I at present would treat, conservatively however. In case of prolapse of the iris, if I saw it when the iris could be returned I would certainly return it. I believe the danger in those cases is from infection, and the danger of infection is greater if the iris remains prolapsed than if returned. If I could not return it without too much violence to the iris, if it were not prolapsed to a considerable extent, I should use the galvano-cautery. In that way, I believe the danger of infection is lessened. In regard to the treatment of penetrating wounds, I think we are all becoming more conservative. Often we can preserve eyes from which we can extract foreign bodies, especially a piece of steel, with perfect vision. I have several such cases with almost perfect vision from which I have extracted pieces of steel, and in some of those cases, I have either excised pieces of iris or returned the prolapsed iris.

DR. SCOTT.—Mr. President, the trouble I have had with prolapsed iris has not been so much sympathetic ophthalmia, as I have had four cases of of severe ophthalmia. One a case which had prolapsed iris. I desired to remove the prolapsed piece and they would not consent to it. All these cases of injury about the ciliary region have been a source of great anxiety to me, and especially when the wound has healed and there is a contraction of a scar. I have seen few of these cases that have not been followed sooner or later by sympathetic trouble, and ultimately require enucleation.

Lately I had a very interesting case of injury; a man found a railroad torpedo and burst it open. It exploded and a piece of it went into his eye. I removed the prolapsed iris, and the lens seemed to be transparent. There was considerable hemorrhage and I questioned whether the piece had gone into the eye. I kept him under observation two or three weeks, and finally the eye-ball commenced to shrink. I advised him to have enucleation, and removed his eye a few days before I came away, and found that a foreign body had passed completely through the eye and lodged opposite the optic nerve, passing through the posterior part of the eye in contact with the optic nerve, so that when I came to cut through the optic nerve I found there was a foreign body to cut through. This piece was twice as large as a grain of wheat. I do not understand how that could pass through the lens and the ciliary region and the lens remain perfectly transparent, three weeks after the accident.

My experience in all injuries of the eyes is that injuries in the ciliary region are much more serious than in any other. Also, I believe it is better where we have prolapsed iris, unless we can easily reduce it, to remove it.

Dr. H. H. Weer.—Mr. Chairman: I recently had a case of a man attempting to drive a nail. The nail flew up and struck him across the ciliary region, curving through the cornea downward and outward. The aqueous humor at once discharged. He had to take hold of the nail with his fingers and pull it out of his eye. He then hunted for the nail in the dark, found it, drove it into the board, went into the house and retired. He suffered no inconvenience. Next morning he went to the nearest physician, who put him in his carriage and brought him to me. I saw that there had been a complete opening into the anterior chamber. There was hemorrhage in the anterior chamber. Fortunately the wound closed and the aqueous humor reformed. Having been taught by Dr. Rosie, an injury across the ciliary region, denominated by him "the danger line," to call for immediate enucleation, I used 4 per cent solution of atropia in order to save my iris. When I next saw the patient I noticed that there was discoloration of the lens. The lens was in the anterior chamber. I made preparation for enucleation, when they came again. I found that the crystalline lens had retired from the aqueous chamber and out of sight. I was also met with a flat refusal to enucleate the eye. The case in my estimation was one of ocular anesthesia. That man never had a particle of pain. There was a greenish tinge to the iris. I repeatedly asked him if he had pain, any neuralgia of the forehead, nasal, temporal or molar, and I failed to get any indication of pain. I had the patient still under observation and the question in my mind was the crystalline lens having retired within the vitreous chamber, whether or not it would be safe for me to attempt to take out that crystalline lens, running the risk of losing the vitreous, or whether I had better enucleate or await developments. I am still awaiting some symptom of danger. I still have the chance to take the alarm at the earliest moment. If the alarming symptom comes I can then enucleate at once. I merely wish to put myself on record as being one in favor cf conservative surgery in injuries to the eye-ball.

Dr. L. R. Ryan.—I can recall a case that occurred a few months ago. A man was chopping a piece of wood and a splinter produced an injury to the cornea that prolapsed the iris. The prolapse was returned and by the use of eserin for several weeks the wound healed kindly and there were no symptoms of inflammation. I had two or three other cases treated in the same way, and it seems to me that eserin has a more important place in the treatment of the eyes than we attribute to it. It prevents the tendency to glaucoma, which is apt to follow any inflammation of the iris where we use atropin alone. If we would confine ourselves to eserin in connection with atropin in iritis, or inflammation of the iris from disease, our results would be far better than they are at present. That has been my experience in the last two years.

Dr. Taylor.—Mr. Chairman, I read my paper most hurriedly from the fact that there are several papers to read yet. It will not take a long time to discuss it. I do not wish to make light of the danger which every injured eye has; the danger from sympathetic ophthalmia. That is the danger, and yet if we keep that eye under observation we are ready at any time it becomes necessary to treat it. Often-times our patients leave us and we fail to see them in time and it becomes too late. I recall to my mind one case of injury to the cornea, not apparently a very serious injury. The patient was doing, as I thought, well. It was a case in which there was no pain, and so the patient who thought she was doing well enough staid away. She came back in two or three weeks, and I found sympathetic ophthalmia had developed in the other eye and advised enucleation. The patient said: "No, I would rather be blind than have my eye taken out." She would not have it taken out and she is totally blind to-day in both eyes. And yet, the case was not one in the first place that any one would have thought of enucleating. It was a case of neglect, not neglect on the part of the doctor, because he had no chance to see the case, as the patient did not come back.

I merely wanted to call attention in the paper to the fact that, as it was said by our chairman, I believe many eyes are enucleated which might be saved, keeping in mind the serious dangers in cases like those Dr. Scott has mentioned. If a foreign body remains in the eye, the eye must come out sooner or later, but if we are sure the foreign body is out, then I believe we should wait a reasonable time unless the eye is injured to such an extent that it is hopeless.

RELATIONSHIP OF OPTIC ATROPHY TO LOCOMOTOR ATAXY.

By H. I. JONES, M.D. L.R.C.P.E.

Member American Medical Association, California State Medical Society and San Francisco County Medical Society.

I desire to point out the special features of the relationship of the optic atrophy to ataxy, and have a case to demonstrate my topic:

J. W. H., aged 27, native of the United States. Past history: He has suffered for the last five years from rheumatic pains in various parts of his body, and from nervous twitching, lightning pain in leg, trunk and arms. No history of syphilis. He has used tobacco and stimulants freely. About a year ago he was advised to go to Paso Robles Springs, and use the mud baths for his rheumatic pains; no relief was obtained; a few weeks after his return he complained of defective vision, first of the left eye then the right. January 31, 1894, when he first came under my care, I found that he was totally blind and suffering from a rapid nystagmus, and lightning pain in both legs. Ophthalmic examination showed atrophy of both optic discs; owing to the rapid movement of the nystagmus it was very difficult to make a thorough examination of the fundus. Physically he is in perfect health. He has Westphal's symptom, absence of the knee reflex, but lacks the tabes gait; he tells me that his gait has always been normal. Many patients see no relation between their pains and their amaurosis or ataxy, especially if these pains come on, as in this case years before. He has Argyle Robertson symptoms. Under treatment he has made slight improvement. Nystagmus is less, he can see shadows in my office; for instance he pointed out a picture frame in my consulting room. To test him and to show that it was not visionary, I requested him to walk up to the picture and place his hand on the left hand side of the picture, which he did. Treatment has been both local and constitutional. Locally, blisters to the cervico-dorsal region, leeches to the temple, cautery of the spine, galvanic and faradic currents. Internally, strychnia sulph. hypodermically, and by the stomach arsenite of strychnia, pilocarpin, iodid of potassium and protoiodid of mercury.

There are few diseases which present such a multiplicity of symptoms as are found in the locomotor ataxy. This patient was totally blind when he came to consult me, so I could not test his field of vision, which is a very significant symptom in cases of atrophy in tabes. There is an intimate correspondence between the development and functions of the brain and those of the optic nerve and retina; the connection is still increased by the communication which exists between the lymph spaces of the eye and those of the brain and spinal cord. These anatomic conditions not only account for the occurrence of neuroretinitis and other ocular changes in disease and injury of the spinal cord, but a Polish physician has traced a connection between errors of refraction and curvature of the spine. The eye is not a separate autonomous organ, living as it were a life apart, nor is it a mere appendage or accessory, convenient and advantageous to the rest of the organism; on the contrary it is in closest relationship with the rest of the body, and participates in its moods. Erb tells us that a brisk cutaneous irritation causes the pupil to enlarge; pinching a comatose man will often enlarge the pupil, but the pupil in tabes is not affected by such procedure.

In all cases of atrophy of the optic nerve we should inquire for lightning pains, test the knee reflex, whether gait is normal or not. The pains are often the bridging symptoms betwixt so-called uncomplicated amaurosis and tabes. Charcot and others attribute the cause of optic atrophy to gray degeneration and to be parenchymatous. The eye-ball and its appendages draw their blood supply from two main sources, the internal and external carotid arteries. By means of the blood vessels and the fluid which circulates within them, foreign or other morbific material may be carried along the blood current into the eye.

The eye and its appendages receive the whole or part of six of the cranial nerves. as well as many fibers of the sympathetic nerve which influences the nutrition of the eye, controlling the size of the blood vessels, and regulating the size, equality and mobility of the pupil. That a certain portion of the spinal cord exercises a direct influence on the eyes has been incontestably established by experiments of modern physiologists. Brown-Sequard demonstrated that the filaments of the sympathetic that supply the eye take their origin from that part of the spinal cord which is contiguous to the origin of the first pain of dorsal nerves, and that portion of the spinal axis which extends from the fifth cervical to the tenth dorsal vertebra possesses a distinct influence on the organ of vision, and has been termed by physiologists, "cilio-spinal" and sometimes "oculo-spinal." The conclusion that must necessarily be deducted from these observations is that the portion of the spinal cord, "oculo-spinal axis," includes within itself both vasomotor and oculo-pupillary filaments; which are connected with the cervical portion of the sympathetic. It is not surprising, therefore, that the eye is very susceptible to all those influences, healthy and morbid, which affect the nervous system generally, or the special innervating apparatus of the eye, either at the center, the periphery or in any part of its course. The special feature in this case is the absence of the gait.

DISCUSSION.

Dr. Young, Burlington, Iowa—Some years ago, we had an interesting paper on myopia. At that time I had an illustrative case, and can now recall five cases which might be considered under this head. I want to give the Section, briefly, some peculiarities observed in five cases. Two were cases in which rapid optic nerve atrophy came on, and they went blind in a very short time. In those cases there was absence of the reflex and some of the other symptoms of dorsalis, but we could never make out a plain case. A few other cases of unmistakable dorsalis have come under my care and observation. Typical cases have had no eye symtoms whatever. The fifth case had typical dorsalis as the result of an injury, and had rapid, progressive optic atrophy and became entirely blind. The question arises, Should we not make a better classification of dorsalis in connection with eye symptoms than we have at present? Are we to expect in all cases our visionary image of cases? I think not. My observation would be like this: Where we get typical dorsalis as the result of direct injury, traumatism, I should look for it. In pure asthenopic dorsalis where the symptoms come on with staggering gait, pains, etc., I have come to the conclusion that we can correct it very often.

A NEW AND CONVENIENT ARRAGEMENT OF ROTARY PRISMS.

By EDWARD J. BROWN, A.M., M.D., Minneapolis, Minn.

After much suffering from heterophoria and more or less satisfactory effort to relieve such trouble in myself and others, I hailed the paper of Dr. Geo. M. Gould as a ray of genuine daylight, and at once put his theories to the test. The results in my own and a good number of other cases have been highly satisfactory.

As a means of carrying out the Gould exercises, I found the prismatic arrangements at my command very cumbersome and unsatisfactory. Dr. Gould's double battery of forty prisms seemed altogether too unwieldy for convenient use. It at once occurred to me that an arrangement of rotary prisms, like Stevens phorometer, except that they should revolve in opposite directions, would answer the indications perfectly. With the assistance of Mr. Carl Thayer, a local jeweler, I have constructed an instrument which I find very useful. It consists of two 30 degree prisms mounted on two clock wheels, geared together so as to rotate in opposite directions, on a brass plate. The prisms are rotated by a handle firmly attached to one wheel, and a pointer and scale indicate at a glance the power of abduction and adduction in a given case, with a range from 0 to 60 degrees.

By a simple arrangement one prism may be disconnected from the other, and revolved alone for the purpose of measuring the strength of, or exercising, the vertical muscles. A clip might be easily added to hold a third prism base up or down, but I find it better in practice to use neither device, but to exercise the vertical muscles by slightly revolving the instrument in abduction or adduction in the horizontal plane, by means of a narrow vertical crossbar which serves as a means of suspension above and a firm handle below. The whole is suspended from a swinging arm, and by means of a simple automatic clamp easily placed at the height of the patient's eyes. It might equally well be swung from the ceiling with a weight and pulley. The instrument serves perfectly its purpose whether we choose Gould's system of over-weighting the muscle, or Savage's rhythmical exercise.

I find in practice the best plan to be a modification combining the advantages of each, *i.e.*, rotating the prisms slowly up to and beyond the patient's power to fuse, when he closes his eyes for a few seconds and the prisms are again placed at zero.

In some cases this over-weighting, even for once or twice will cause a severe headache, and there is consequently need of a wise discretion in its use. This is especially true of forced adduction, or sursumduction with the *rotary* prisms, since the unbroken and gradual increase of prismatic strength adds decidedly to the ability to overcome the prisms.

Gould advises the use of his method in accommodation. A decided advantage of the rotary prisms is that in most cases sufficient strain can be put upon the muscles at twenty feet. A further advantage is the low cost of the instrument, which ought not to exceed $10.

As regards results I will only mention two out of many cases. In one, after several months ineffectual use of rhythmical exercise, adduction was brought by Gould's method and rotary prisms from 6 degrees to 80 degrees in four weeks; and in a second, adduction of 10 degrees was brought to 70 degrees in two weeks, the patient having no other than a few moments exercise daily at my office.—*The Journal.*

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Metamorphopsia.

It will be both interesting and profitable for numerous observers to study this question from a clinical standpoint, and then make public the results of these studies. We desire to publish a symposium on metamorphopsia as observed by astigmatics and caused by the wearing of correcting cylinders. The character of the metamorphosia should be noted. Does the floor incline from or towards the patient, or to the right or left? What shape is given to a rectangle? What the duration of the metamorphopsia in each case? Give the relationship of the meridians of greatest curvature, whether converging or diverging above, or parallel, in all cases troubled by the metamorphopsia. Note the character of cases in whom the cylinders produce no change of form; and give the relationship of the meridians of greatest curvature in these cases.

Each observer can determine the number of cases to be studied before making his report, and can close his report by giving his own theoretical views.

We desire to publish this symposium in an early issue of vol. V.

Why The Practice?

While standing by Mr. Nettleship's desk, in the Royal Ophthalmic Hospital, one year ago, a woman presented herself complaining that her glasses, given her a few days before, gave her no comfort. The note made of her refraction showed that she had compound hyperopic astigmatism and that the meridian of greatest curvature for the right eye was at 70°, and for the left, at 80°. The note showed that the axis of the cylinder had been placed at 90° for each eye. I ventured to ask Mr. Nettleship why this was done. His reply was that they had fallen into the habit of placing the axes of the cylinders at 90° when the test showed the location of the best meridians near the vertical, and for no other reason than that many patients were made more comfortable by this change. I stated to him that this patient could never use her cylinders comfortably thus placed. I further stated that if the two cylinders for this case were placed at 75° there would be some promise of comfort. He asked the reason for my statement. I gave it, in substance; you may find it in full by referring to No. 10 of the current volume of the Record, pages 376 to 389.

Volume IV.

With this number, vol. IV of the Record ends. The judgment of the reader has been made as to the matter that has appeared from time to time. Some of the contents may not have been of any service to one individual and yet helpful to another. Altogether, we think our readers will agree that at least value received has been given. We ourselves have learned much from our contributors. Pagenstecher's advice as to the operation for secondary cataract has no doubt been put to the practical test by many operators, and has been pronounced good.

If you over-looked this point in his paper, it will pay to re-read it.

Mules' treatment of corneal ulsers by means of discs of iodoform, boric acid and gelatin was first brought to the attention of many of our readers by a little paragraph in the RECORD. Those who have availed themselves of this new treatment cannot be other than pleased.

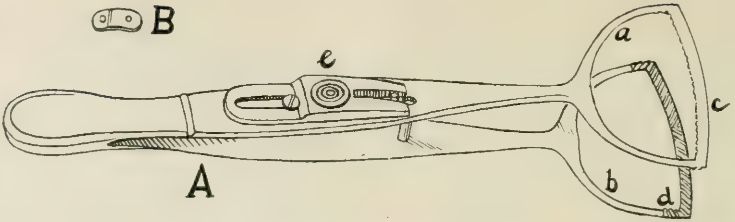
Many other points might be mentioned to show that vol. IV of the RECORD has maintained its reputation for giving out thoughts of a highly practical nature. We propose continuing this good work into and through

Volume V,

Which begins with the next issue. Thanking our contributors, subscribers, and advertisers for their help in the past, we will enter on the work of editing and publishing the new volume with the hope that our cordial relationship may continue, and that all of us together may make volume V. of greater service than any of the preceding volumes. We now promise our contributors that they will have as many readers in this and other countries, as they would have if they were to choose some other special journal as a medium of communication; we promise our subscribers, new and old, that they shall have value received, at least—we believe they will realize this many times repeated. We would state to our advertisers that the very fact that their ads. appear in our pages is an endorsement of their wares, for every year we decline to admit to our advertising pages matter of a doubtful nature. We trust they have been benefited by having given us their patronage, and that they may find it to their interest to continue with us through another volume.

Entropion Forceps and Suture Plate.

The cut on page 474 shows a most useful instument (A) and a very practical and helpful appliance (B). Each blade of the forceps terminates in a stirrup-shaped extremity, the foot of each being slightly curved on the flat, so as to confrom to the shape of the lid. From the foot, a shoulder one sixth inch long extends up each arm, the purpose of which is to tightly compress the lid-



margin when the forceps are made to grasp the lid. The lower blade of the forceps is placed beneath the lid and the upper blade is placed on the skin-surface, enough of the lid being included to allow about one sixth inch of the free margin to be included in the fenestrum. By means of the sliding clamp (e) the blades are made to grasp the lid firmly. By this means the lid is easily everted and held in position for making the Burow incision, and the vertical cuts, the former to widen the lid, the latter to lengthen, it and the two together insuring the out-turning of the included margin. The advantage claimed for the forceps shown in the cut is at least twofold: first, the fenestrum in the outer blade makes it almost certain that in making the Burow incision and the vertical cuts, the skin will not be incised or punctured as would likely occur if this blade were solid; second, the properly regulated pressure entirely prevents bleeding while the operation is being done.

The suture plate, as modified by Dr. Geo. H. Price, is invaluable in muscle advancements and muscle shortening. After the stitch has been taken, the two ends of the thread are passed through the holes in the plate and the knot is tied over it, the concave surface resting on the globe. On the fifth day the suture can be readily cut on one side of the knot, passing the blade of the scissors along the transverse groove, and as easily removed.

These devices can be obtained of Theo. Tafel, of this city, whose advertisement can be found on third page of the cover of this issue.

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